

AD-A141 569

MICROCOMPUTER NETWORK FOR COMPUTERIZED ADAPTIVE TESTING 1/5

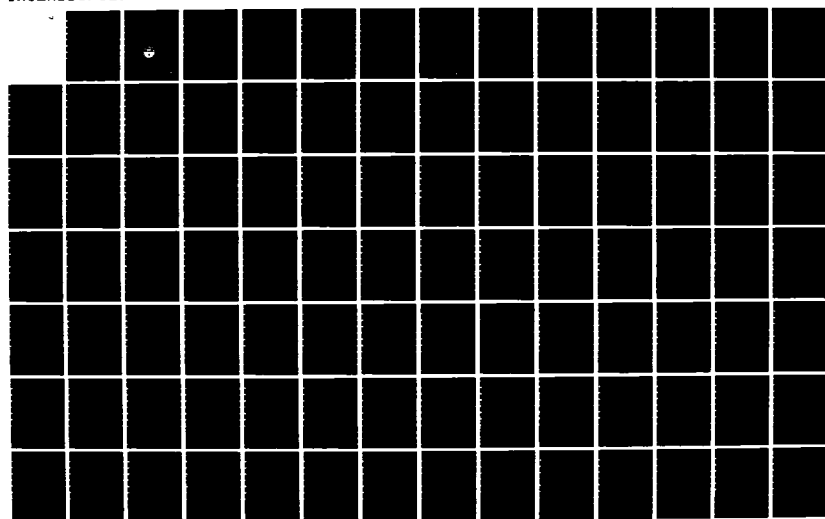
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DEVELOPMENT CENTER SAN DIEGO CA B QUAN ET AL. MAR 84

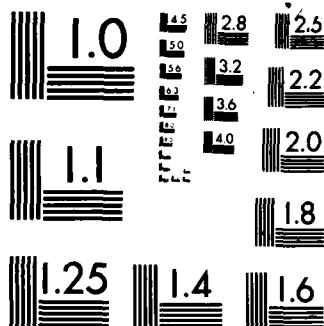
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MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

SUPPLEMENT TO  
NPRDC TR 84-33

MARCH 1984

MICROCOMPUTER NETWORK FOR COMPUTERIZED ADAPTIVE  
TESTING (CAT): PROGRAM LISTING

AD-A141 569

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AD-A141 567

SUPPLEMENT TO  
NPRDC TR 84-33

March 1984

**MICROCOMPUTER NETWORK FOR COMPUTERIZED  
ADAPTIVE TESTING (CAT): PROGRAM LISTING**

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A faint administrative form with several checkboxes and handwritten marks. One checkbox is checked with a diagonal line. There are also some handwritten numbers and letters.

Navy Personnel Research and Development Center  
San Diego, California 92152

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**CATPROJECT.TEXT**  
**CAT System Driver Textfile**

```

(*)
(*)
(*)      COMPUTER ADAPTIVE TESTING (CAT) PROJECT
(*)
(*)      Navy Personnel Research and Development Center
(*)      San Diego, California
(*)      VERSION [ 1.03 ]      Feb 28, 1983
(*)
(*)
(*)      Textfile : CATPROJECT.TEXT      Volume : TFILES
(*)      Codefile : CATPROJECT.CODE      Volume : CATDATA
(*)
(*)
(*)      Execution of this program allows access to the major subprograms of
(*) the Computer Adaptive Testing System. These are :
(*)
(*)      1. ADMIN      (test administration)
(*)      2. P.MGR      (test parameters configuration)
(*)      3. T.MGR      (test questions database management)
(*)      4. E.MGR      (examinee database management)
(*)      5. S.MGR      (strategy database management)
(*)      6. G.MGR      (graphics database management)
(*)      7. D.MGR      (system diagnostic program)
(*)
(*)      The user can execute any of the above subprograms or return to the
(*) Pascal operating system from this program here. Upon completion of any
(*) of the above programs, control is restored to this program by use of the
(*) function SETCHAIN. This allows access to all major codefiles of the CAT
(*) Project with one main driver program.
(*)
(*)
(*)

```

```

PROGRAM CATPROJECT;
USES CHAINSTUFF;

```

```

CONST BELL = 7;
      VERSION = ' [1.03] ';

```

```

TYPE SETOFCHAR = SET OF CHAR;

```

```

VAR COMMAND,
    OUTPUT : CHAR;

```

```

(*) ..... *)

```

```

(*) clear the screen *)
PROCEDURE PAGE(DUMMY : CHAR);
BEGIN
  WRITE(CHR(28));
  GOTOXY(0,0);
END;  (*) page *)

```

```

(*) ----- *)

```

```

(*) rings the bell *)
PROCEDURE SQUAWK;
BEGIN
  WRITE(CHR(BELL));
END;  (*) squawk *)

```

```

(*) ----- *)

```

```

(*) read an acceptable character from the keyboard *)
FUNCTION GETCHAR(OKSET : SETOFCHAR;
                FLUSHQUEUE,ECHO,BEEP : BOOLEAN) : CHAR;
VAR MASK : PACKED ARRAY[0..0] OF CHAR;
BEGIN
  IF FLUSHQUEUE THEN UNITCLEAR(2); (*) flush buffer *)
  REPEAT
    UNITREAD(2,MASK,1);

```

```

        IF BEEP AND NOT (MASK(0) IN OKSET) THEN SQUAWK;

        UNTIL MASK(0) IN OKSET;
        IF ECHO AND (MASK(0) IN [CHR(32)..CHR(126)]) THEN
            WRITE (MASK(0));
        GETCHAR := MASK(0);
    END; (* getchar *)

    (* ----- *)

    (* displays which program you can branch to *)
    PROCEDURE MENU;
    VAR X,Y : INTEGER;
    BEGIN
        PAGE (OUTPUT);
        X := 16;
        Y := 8;
        GOTOXY(21,8);
        WRITE('CAT PROJECT MENU ',VERSION);
        GOTOXY(8,4);
        WRITE('Select one of the following programs by entering its number. ');
        GOTOXY(X,Y);
        WRITE('1.  QUIT');
        GOTOXY(X,Y+1);
        WRITE('2.  TEST ADMINISTRATION');
        GOTOXY(X,Y+2);
        WRITE('3.  CONFIGURE TEST PARAMETERS');
        GOTOXY(X,Y+3);
        WRITE('4.  TEST DATABASE MANAGEMENT');
        GOTOXY(X,Y+4);
        WRITE('5.  EXAMINEE DATABASE MANAGEMENT');
        GOTOXY(X,Y+5);
        WRITE('6.  STRATEGY DATABASE MANAGEMENT');
        GOTOXY(X,Y+6);
        WRITE('7.  GRAPHICS EDITOR');
        GOTOXY(X,Y+7);
        WRITE('8.  CAT SYSTEM DIAGNOSTICS');
        GOTOXY(X,Y+10);
        WRITE('Enter Choice # : ');
    END; (* menu *)

    (* ..... *)

    (*** main program ***)
    BEGIN

        (* display options *)
        MENU;

        (* get selection *)
        COMMAND := GETCHAR(['1'..'8'],TRUE,TRUE,TRUE);

        (* set the program to branch to *)
        CASE COMMAND OF
            '1' : ;
            '2' : SETCHAIN('CATDATA:ADMIN');
            '3' : SETCHAIN('CATDATA:P.MGR');
            '4' : SETCHAIN('CATDATA:T.MGR');
            '5' : SETCHAIN('CATDATA:E.MGR');
            '6' : SETCHAIN('CATDATA:S.MGR');
            '7' : SETCHAIN('CATDATA:G.MGR');
            '8' : SETCHAIN('CATDATA:O.MGR');
        END;

        IF COMMAND <> '1' THEN
            BEGIN (*1*)
                PAGE (OUTPUT);
                GOTOXY(15,10);
                WRITE('Loading ');
                CASE COMMAND OF
                    '2' : WRITE('Test Administration Program. ');
                    '3' : WRITE('Test Configuration Program. ');
                    '4' : WRITE('Test Manager Program. ');
                END;
            END;
        END;
    
```

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```
'5' : WRITE('Examinee Manager Program.');
```

```
'6' : WRITE('Strategy Manager Program.');
```

```
'7' : WRITE('Graphics Manager Program.');
```

```
'8' : WRITE('Cat System Diagnostic Program');
```

```
END; (* cases *)
```

```
END; (*1*)
```

END. (\* catproject \*)

**ADMIN.DIR:**  
**Subdirectory - Test Administration Textfiles**



```
(*S+*)
(*-----*)
(*      Textfile : ADMIN.DIR/ADMIN.TEXT      Volume : TFILES      *)
(*      Codefile : ADMIN.CODE                Volume : CATDATA      *)
(*-----*)
(* File Last Modified :   October 7 1983      NPRDC      *)
(*-----*)
(*                      VERSION 1.05          *)
(*-----*)
(*      1. 256 K of memory required.          *)
(*      2. Graphics questions capability      *)
(*      3. Thunder clock required.            *)
(*-----*)
(* Description :                              *)
(*      This program gives examinees a prescribed set of subtests. It begins *)
(* with an introduction to the computer, then logs in an examinee, and gives *)
(* him the subtests. The main modules of the program are :              *)
(*      1. Proctor routines.                                          *)
(*      2. General instructions (computer familiarization)          *)
(*      3. Login procedures.                                          *)
(*      4. Examinee pretest initialization.                          *)
(*      5. Loading subtest directory and appropriate strategy data structure *)
(*      (if any).                                                    *)
(*      6. Administering a question.                                  *)
(*      7. Updating the examinee ability level.                      *)
(*      8. Feedback routines.                                         *)
(*      9. Examinee backup to compressed file for data analysis.    *)
(*-----*)
(*      This program basically controls the flow of execution through these *)
(* modules. All communication between modules occurs with global variables *)
(* in the program. Three major loops exist :                        *)
(*      (1) Giving continuous sessions.                               *)
(*      (2) Giving a sequence of subtests.                           *)
(*      (3) Giving a sequence of questions.                          *)
(* Control through these loops and modules can be altered by commands from *)
(* the proctor routines.                                             *)
(*-----*)
```

# PROGRAM TESTADMINISTRATION;

```
USES PGRAF,
    REALMODES,
    TRANSCEND, (* needed for real functions *)
    APPLESTUFF, (* needed for randomizer *)
    CHAINSTUFF; (* allows return to project driver *)

(* const,type,& var declarations *)
(*$I /TFILES/ADMIN.DIR/A.DEC.TEXT *)

(* proctor routines *)
(*$I /TFILES/ADMIN.DIR/A.PROCT.TEXT *)

(* computer familiarization *)
(*$I /TFILES/ADMIN.DIR/A.CF.TEXT *)

(* general instructions part 2 *)
(*$I /TFILES/ADMIN.DIR/A.GI.TEXT *)

(* short version - doesn't get personal data *)
(*$I /TFILES/ADMIN.DIR/A.LOGIN.TEXT *)

(* initialize examinee test rscores *)
(*$I /TFILES/ADMIN.DIR/A.INITE.TEXT *)

(* subtest load *)
(*$I /TFILES/ADMIN.DIR/A.LOADT.TEXT *)

(* feedback routines *)
```

```

(*$! /FILES/ADMIN.DIR/A.FBACK.TEXT *)

(* writes examinee summary to text file *)
(*$! /FILES/ADMIN.DIR/A.ESUMM.TEXT *)

(* disk io *)
(*$! /FILES/ADMIN.DIR/A.IO.TEXT *)

(* utility subroutines *)
(*$! /FILES/ADMIN.DIR/A.1UTL.TEXT *)

(* utility subroutines which can call proctor *)
(*$! /FILES/ADMIN.DIR/A.2UTL.TEXT *)

(* ability update method *)
(*$! /FILES/ADMIN.DIR/A.UABIL.TEXT *)

(* administer question/get response *)
(*$! /FILES/ADMIN.DIR/A.QUEST.TEXT *)

(* calculate predicted asvab score for paper/pencil *)
(*$! /FILES/ADMIN.DIR/A.PASVAB.TEXT *)

(* -----
BEGIN (* main program *)

    (* initialize variables *)
    (* File : CAT.1UTL *)
    INITCAT;

    (* give continuous sessions *)
    REPEAT

        (* display a session header and initialize *)
        (* File : CAT.1UTL *)
        SESSIONHEADER;

        (* give computer familiarization *)
        (* File : CAT.CF *)
        IF NOT SKIPFAM THEN
            COMPUTERFAMILARIZATION;

        (* give general instructions *)
        (* File : CAT.GI *)
        IF (FLOWCODE = CONTINUE) AND (NOT SKIP) THEN
            GENERALINSTRUCTIONS;

        (* mark time spent in orientation *)
        (* TIME is in File : CAT.1UTL *)
        OTIME := TRUNC(TIME - SESSSTART);

        IF FLOWCODE = CONTINUE THEN
            BEGIN (*1*)

                (* log-in examinee *)
                (* File : CAT.LOGIN *)
                LOGIN;

                (* controls initialization of test scores *)
                INITSCORES := FALSE;

                (* give a loop of subtests *)
                WHILE ((FLOWCODE = CONTINUE) OR (FLOWCODE = NEXTST)) (* normal flow *)
                    AND (TINDEX < GMAXSUBTEST) DO (* max # of tests not taken *)
                    BEGIN (*2*)
                        FLOWCODE := CONTINUE;

                        (* index into setup parameter arrays, also saved as *)
                        (* 'examinee.lasttest' for abnormal session exits *)
                        TINDEX := TINDEX + 1;

                        (* mark where examinee currently is in testing sequence *)

```

```

EXAMINEE.LASTTEST := TINDEX;

(* initialize the examinee test/parameters *)
(* File : CAT.INITE *)
INITEXAMINEE;

(* give a test if anymore to give , if currtest is >= 8 *)
(* that means there is a test to be given. *)
IF CURRTEST <= MAXSUBTESTS THEN
BEGIN (*3*)

    (* clock the beginning of the subtest *)
    (* File : CAT.1UTL *)
    SUBTSTART := TIME;

    (* load the subtest according to strategy, give test *)
    (* instructions and sample questions. *)
    (* File : CAT.LOADT *)
    LOADTEST;

    (* mark the time spent in instructions and samples *)
    TESTS.STINSTRTIME := TRUNC(TIME - SUBTSTART);

    (* give a loop of questions *)
    WHILE (FLOWCODE = CONTINUE) (* normal flow mode *)
        AND (QNUM < CURRTLENGTH) DO (* max # of questions not taken *)
    BEGIN (*4*)

        (* select question according to strategy, display , *)
        (* get response, save response, & update counters. *)
        (* File : CAT.QUEST *)
        ADMINISTERQUESTION;

        (* if question was answered *)
        IF (FLOWCODE = 1) OR (FLOWCODE = 6) THEN
        BEGIN (*5*)

            (* save the ability and variance *)
            TESTS.ITEMINFO(QNUM).THETA := CURRABILITY;
            TESTS.ITEMINFO(QNUM).ERROR := CURRVARIANCE;

            (* give feedback if any *)
            (* File : CAT.FBACK *)
            FEEDBACK(FBITEM, SPARAMS.ITEMFB, SPARAMS.ITEMOUTPUT);

            (* increment array index for next question *)
            QNUM := QNUM + 1;

            IF CURRVARIANCE <= S_PARAMS.CK_ERROR(T_INDEX) THEN
                FLOWCODE := NEXTST;

        END; (*5*)
    END; (*4*) (* loop of questions *)
    PAGE(OUTPUT);

    (* save final ability/variance *)
    TESTS.ESTABILITY := CURRABILITY;
    TESTS.VARIANCE := CURRVARIANCE;

    (* save amount of time spent at this subtest *)
    TESTS.STTIME := TRUNC(TIME - SUBTSTART);

    (* subtest feedback *)
    (* File : CAT.FBACK *)
    FEEDBACK(FBSUBTEST, SPARAMS.SUBTESTFB, SPARAMS.SUBTESTOUTPUT);

    (* look-up and save predicted asvab *)
    (* File : A.PASVAB *)
    EXAMINEE.PREDASVAB(TINDEX) := PREASVABCALC(CURRABILITY);

```

```

(* check subtest stop flag *)
(* IF FLOWCODE = 1 THEN
    CALLPROCTOR(S,FLOWCODE); *)

(* write subtest results to disk *)
(* File : CAT.IO *)
UPDATERESULTS(TNUM);

(* is taking succeeding subtests from the beginning and must *)
(* initialize his test scores. *)
INITSCORES := TRUE;

(* save current examinee data *)
(* File : CAT.IO *)
UPDATEEXAMINEE(ERECNUM);

END; (*3*)

(* increment file record # to store next subtest *)
TNUM := TNUM + 1;
END; (*2*) (* loop of subtests *)

(* give session feedback *)
IF FLOWCODE = 1 THEN
    EXAMINEE.LASTTEST := 128; (* flag examinee totally done *)

(* if examinee leaves session in middle of timed test, save time *)
(* expended. *)
IF (FLOWCODE = 6) AND (CURRSTRAT = TIMED) THEN
    EXAMINEE.PREVTIMELASTTEST := ELAPSEDTIME;

END; (*1*) (* continue after general instructions *)
IF FLOWCODE = 1 THEN
    FEEDBACK(FBSESSION,SPARAMS.SESSIONFB,SPARAMS.SESSIONOUTPUT);

(* give closing session message and save some data *)
(* File : CAT.IUTL *)
CLOSING_MESSAGE;

(* save examinee data in coded textfile if done *)
(* File : CAT.ESUMM *)
IF (EXAMINEE.LASTTEST > GMAXSUBTEST) AND (NOT DEMOFLAG) THEN
    BEGIN
        CALLPROCTOR(S,FLOWCODE); (* last proctor call *)
        EXAMINEE.NUMPROC:=EXAMINEE.NUMPROC -1;
        ESUMMARY;
    END;

UNTIL FLOWCODE = ENDOFDAY;

END. (* catdemo *)

```

```

(*****)
(*)                                     (*)
(*)      Textfile : ADMIN.DIR/A.DEC.TEXT      Volume : TFILES      (*)
(*)      Codefile : ADMIN.CODE ('Include' file) Volume : CATDATA    (*)
(*)                                     (*)
(*****)
(*) File Last Modified :   October 7 1983      NPROC      (*)
(*****)

```

```
(* constant, var. & type declarations *)
```

```
CONST (* ascii values *)
BELL      = 7;
LARROW    = 8;
RARROW    = 21;
RET       = 13;
ESC       = 27;
SPACE     = 32;
ASCII0FFSET = 48; (* ascii zero *)
NIL       = -1; (* signifies not used/bad value *)
```

(\* these are ascii for the a b c d e keys \*)

```
AKEY = 74;      (* ascii J *)
BKEY = 75;      (* ascii K *)
CKEY = 76;      (* ascii L *)
DKEY = 59;      (* ascii ; *)
EKEY = 39;      (* ascii ' *)
```

(\* flowcode values, serves as path gates for program flow \*)

```
CONTINUE = 1;
EXITGI   = 2;
EXITLOGIN= 3;
EXITSQ   = 4;
NEXTST   = 5;
NEXTSESS = 6;
ENDOFDAY = 7;
```

(\* flowcode values for ghost routines \*)

OLD = 1;  
SINGLE = 2;  
AUTO = 3;

(\* keypad assignments \*)

```
HELPKEY      = 92; (* ascii \ *)
YESKEY       = 13; (* ascii <enter> *)
NOKEY        = 45; (* ascii - *)
ERASEKEY     = 46; (* ascii . *)
```

(\* maximum size of ascii buffer \*)

MAXI TEMBUF = 2047:

(\* line character buffer size, 0 - 79 = 80 char \*)

MAXLINEBUF = 79;

(\* question textfile control codes \*)

```
GOTOFLAG      = 128; (* signals gotoxy condition *)
PAGEFLAG      = 129; (* signals another page of text *)
UNUSEDFLAG    = 130; (* signals byte not used *)
ENDITEM       = 131; (* signals end of text for question *)
```

(\* these files must reside on disk ! \*)

```

DATANAME      = 'CATDATA:ITEMPOOL.DATA';      (* question data *)
TEXTNAME      = 'QTEXT:ITEMTEXT.DATA';        (* question text *)
INDEXNAME     = 'CATDATA:TESTINDEX.DATA';      (* test directory *)
EINDEX       = 'CATDATA:EINDEX.DATA';          (* examinee directory *)
INFNAME       = 'CATDATA:EIFNO.DATA';          (* examinee data *)
RESULTS       = 'CATDATA:ERESULTS.DATA';       (* examinee test scores *)

```

```
TABNAME   = 'CATDATA:TABINFO.DATA';    (* information tables *)
SETUPDATA = 'CATDATA:PARAMETERS.DATA'; (* test default parameters *)
```

```
(* slots available in test directory, 0 - 20 *)
MAXSUBTESTS = 20;
```

```
(* maximum question pool per test, 0 - 300 *)
MAXITEMPOOL = 300;
```

```
(* maximum # of sample questions you can have *)
MAXSAMPLES = 5;
```

```
(* slots available in examinee directory, 0 - 50 *)
MAXEXAMINEE = 50;
```

```
(* max # of questions you can give per test *)
QUESTIONS   = 20;
```

```
(* max # of subtests you can give *)
GMAXSUBTEST = 20;
```

```
(* max ability for ghost loop *)
MAXGTHETA = 3;
```

```
(* min ability for ghost loop *)
MINGTHETA = -3;
```

```
(* cat strategy codes *)
NONE = 0;
B102222 = 1; (* original bayesian *)
B54321 = 2;
B108642 = 3;
TIMED = 4;
```

```
(* information table dimensions, used for bayesian strategy *)
(* 36 rows and 20 columns *)
INFOROW   = 36;
INFOCOLUMN = 20;
```

```
(* demo id #, no files are written to disk with this id # *)
DEMOID = 'DEMO';
```

```
(* printer unit number *)
UNITNUMPRINTER = 'PRINTER';
```

```
(* code number to flag compressed graphics *)
COMPRESSED = 1.0;
```

```
VERSION = '[1.05]';
```

```
TYPE (* different types of ways to answer a question *)
ITEMRESPONSES = (CHARVALUE, (* normal multiple choice *)
                 INTVALUE,   (* integer value as answer *)
                 SEVENCHR);  (* seven characters saved as answer *)
```

```
(* ability loop range *)
LOOPRANGE = MINGTHETA..MAXGTHETA;
```

```
(* feedback levels *)
TYPEFEEDBACK = (FBITEM, FBSUBTEST, FBSESSION);
```

```
(* type of question response *)
SEVENTYPE = PACKED ARRAY[1..7] OF CHAR;
```

```
(* social security number *)
IDTYPE = PACKED ARRAY[0..8] OF CHAR;
```

```
(* all characters *)
```

SETOFCHAR = SET OF CHAR;

(\* information table \*)

TABLE = ARRAY[1..INFOCOLUMN,1..INFOROW] OF INTEGER;

(\* test directory \*)

DIRDATA = PACKED RECORD

(\* true ==> this record not occupied \*)  
UNUSED : BOOLEAN;

(\* name of subtest \*)  
TESTNAME : STRING;

(\* directory of pool of questions in subtest \*)  
ITEMCODE : PACKED ARRAY  
[0..MAXITEMPOOL]  
OF INTEGER; (\* question code # \*)

END;

(\* question ptrs/data , information for each question \*)

ITEMDATA = PACKED RECORD

(\* flags if graphics item \*)  
GRAPHICS : BOOLEAN;

(\* valid response ranges for multiple choice \*)  
LOWANSWER,  
HIGHANSWER : CHAR;

(\* block # in file where text starts \*)  
ITEMBLOCK,

(\* byte # in block where text starts \*)  
ITEMPTR,

(\* # of answers if multiple question screen \*)  
ANSWERCOUNT : INTEGER;

(\* information parameters for bayesian strategy \*)  
A,B,C,

(\* currently unused \*)  
PROPCORRECT,  
POINTBISERIAL,  
YOPT,  
XOPT,  
DUMMY1,  
DUMMY2,  
DUMMY3 : REAL;

(\* correct answer to question \*)  
CASE ATYPE : ITEMRESPONSES OF  
CHARVALUE : (ANSWER : CHAR);  
INTVALUE : (INTANSWER : INTEGER);  
SEVENCHR : (CHRANSWER : SEVENTYPE);  
END;

(\* examinee directory \*)

INDEX = PACKED ARRAY[0..MAXEXAMINEE] OF PACKED RECORD

(\* true ==> record available \*)  
UNUSED : BOOLEAN;

(\* social security/id key \*)  
ID : IDTYPE;  
END;

(\* examinee personal data \*)

EXAMEINFO = PACKED RECORD

```

(* social security # *)
ID          : IDTYPE;

(* time spent in computer orientation *)
ORIENTATIONTIME,

(* if timed test, last time when session interrupted *)
PREVTIMELASTTEST,

(* number of proctor calls *)
NUMPROC,

(* total time spent at computer *)
TOTTIMECONSOLE,

(* number of key in errors *)
NUMERRORS,

(* # of last test taken - 1, eg.- if on test 5 then *)
(* this variable holds a value of 4. *)
LASTTEST    : INTEGER;

(* date of log in *)
DATE        : PACKED ARRAY[0..5] OF CHAR;

(* time at log in *)
TIME        : PACKED ARRAY[0..3] OF CHAR;

(* testing configuration given to this examinee *)

(* record # of subtest directories *)
TESTORDER,

(* adaptive strategy *)
STRATEGY,

(* # of questions per test *)
TESTLENGTH  : PACKED ARRAY[1..GMAXSUBTEST]
              OF 0..128;

(* predicted asvab scores for paper/pencil *)
PREDASYAB,

(* initial variance for each test *)
CKERROR     : ARRAY[1..GMAXSUBTEST] OF REAL;

(* flags to control flow of subtests *)
SUBSTOP     : PACKED ARRAY[1..GMAXSUBTEST] OF BOOLEAN;

END;

```

```

(* question scores , data on examinee with respect to question *)
ITEM = PACKED RECORD

```

```

    (* true ==> answered correctly, for seven char answer *)
    ACORRECT : PACKED ARRAY[0..6] OF BOOLEAN;

    (* number of answers *)
    ACOUNT,

    (* which question he took, code # *)
    ITEMNUM  : INTEGER;

    (* true ==> answered it correctly *)
    CORRECT  : BOOLEAN;

    (* ability after answering this question *)
    THETA,

    (* variance after answering this question *)
    ERROR,

```

```

(* time spent answering this question *)
LATENCY : REAL;

(* how he answered the question *)
CASE RTYPE : ITEMRESPONSES OF
  CHARVALUE : (RESPONSE : CHAR);
  INTVALUE : (INTRESPONSE : INTEGER);
  SEVENCHR : (CHRESPONSE : SEVENTYPE);
END;

(* test scores of examinee results *)
SUBTEST = PACKED RECORD

  (* time taken for subtest *)
  STTIME,

  (* time taken for subtest instructions *)
  STINSTRTIME,

  (* number of proctor calls during subtest *)
  STPROCTCALLS,

  (* modified time - time for subtest minus overhead *)
  MOOSTIME : INTEGER;

  (* number of questions he answered *)
  NUMITEMS,

  (* # of correct responses *)
  NUMCORR : 0..128;

  (* final estimate of ability *)
  ESTABILITY,

  (* final variance of ability *)
  VARIANCE : REAL;

  (* results on question level *)
  ITEMINFO : PACKED ARRAY(0..QUESTIONS) OF ITEM;
END;

(* set-up parameters *)
SETUPINFO = PACKED RECORD

  (* flags # tests in sequence, > 28 = no subtest *)
  SUBORDER,

  (* strategy setup *)
  SUBSTRAT : PACKED ARRAY(1..GMAXSUBTEST)
    OF 0..128;

  (* question feedback code *)
  ITEMFB,

  (* question feedback output code *)
  ITEMOUTPUT,

  (* subtest feedback code *)
  SUBTESTFB,

  (* subtest feedback destination code *)
  SUBTESTOUTPUT,

  (* session feedback code *)
  SESSIONFB,

  (* session feedback destination; screen/printer *)
  SESSIONOUTPUT : 0..128;

  (* subtest stop flag *)
  SUBSTOP : PACKED ARRAY(1..GMAXSUBTEST) OF BOOLEAN;

```

```

(* subtest length *)
SUBLENGTH      : PACKED ARRAY[1..GMAXSUBTEST]
                OF 0..128;

(* initial variance *)
CKERROR        : ARRAY[1..GMAXSUBTEST] OF REAL;

END;

VAR (* 0 through 9 *)
    DIGITS,

    (* helpkey, yeskey, nokey, erasekey *)
    CONTROLKEYS,

    (* digits + control keys *)
    KEYPAD : SETOFCHAR;

    (* ability for ghost routines *)
    ABLOOP: LOOPRANGE;

    (* string character buffer *)
    LINEBUF : PACKED ARRAY[0..MAXLINEBUF] OF CHAR;
    (* contains row and column index in the infotable *)
    SAVERC : ARRAY[1..4] OF INTEGER;

    LEVEL,                (* row location inde for the stay routine *)
    OTIME,                (* time spent in computer orientation *)
    ELAPSEDTIME,          (* elapsed time in seconds for timed tests *)
    MAXTIME,              (* maximum time in seconds for timed tests *)
    RITEPREFETCH,         (* directory slot of prefetch if correct *)
    WRONGPREFETCH,        (* directory slot of prefetch if wrong *)
    OPREFETCH,            (* next question to be selected, = one of above *)
    FLOWCODE,             (* controls flow in driver *)
    GHOSTFLOW,            (* flow control for ghost routines *)
    CURRSTRAT,            (* current test strategy *)
    CURRTLENGTH,          (* current # of questions to give *)
    CURRTEST,             (* current record # of subtest *)
    TINDEX,              (* index into test order array *)
    ERECNUM,              (* current examinee record # *)
    QNUM,                (* current array index for question results *)
    TNUM : INTEGER;      (* current test result record file number *)

    SESSSTART,            (* time at start of session *)
    SUBTSTART,            (* time at start of subtest *)
    GTHETA,               (* ghost theta *)
    RITEABILITY,          (* precalculated ability if answered correctly *)
    WRONGABILITY,         (* precalculated ability if answered wrong *)
    RITEVARIANCE,         (* precalculated variance if correct *)
    WRONGVARIANCE,        (* precalculated variance if wrong *)
    CURRABILITY,          (* current examinee ability level *)
    CURRVARIANCE : REAL; (* current variance of ability *)

    STAY,                (* true ==> program runs at one ability level *)
    GHOST,               (* true ==> program in self test mode *)
    REVERSEVIDEO,        (* true ==> screen is inverse *)
    FORTYCOLUMN,         (* true ==> screen is 40 columns *)
    GRAFIX,              (* true ==> console is currently in graphics *)
    SKIP,                (* true ==> skip to log in *)
    SKIPFAM,             (* true ==> skip computerfamiliarization *)
    SAMPLEQUESTION,      (* true ==> giving sample question *)
    TIMEOUT,             (* true ==> time up for subtest *)
    FIRSTQUESTION,       (* true ==> first question given, don't prefetch *)
    DEMOFLAG,            (* true ==> don't update files *)
    INITSCORES,          (* true ==> init test record scores *)
    CURRSUBSTOP,         (* true ==> halt session after subtest *)
    RIGHT,               (* TRUE ==> examinee answered question correct *)
    NEWEXAMINEE : BOOLEAN; (* true ==> first time examinee has logged in *)

```

```

OUTPUT : char;          (* dummy variable for page function *)

SYSTEMDATE : PACKED ARRAY(0..5) OF CHAR;

(* buffer which serves to hold item question ascii or compressed *)
(* graphics information . *)
TRIX : RECORD CASE INTEGER OF
    1 : (ITEMBUF : ARRAY(0..1023) OF INTEGER);
    2 : (ASCIIIBUF : PACKED ARRAY(0..2047) OF 0..139);
END;

(* test directory *)
DIRECTORY : DIRDATA;
FILEDIRECTORY : FILE OF DIRDATA;

(* test question ptrs/data *)
ITEMINFO : ITEMDATA;
FILEITEMINFO : FILE OF ITEMDATA;

(* file of ascii codes, control #'s *)
ITEMTEXT : FILE;

(* examinee personal data *)
EXAMINEE : EXAMINFO;
FILEEXAMINEE : FILE OF EXAMINFO;

(* examinee directory *)
DIR : INDEX;
EDIR : FILE OF INDEX;

(* examinee test results *)
TESTS : SUBTEST;
FILETESTS : FILE OF SUBTEST;

(*** set-up variables ***)
SPARAMS : SETUPINFO;
FILESPARAMS : FILE OF SETUPINFO;

(* info table *)
INFOTABLE : TABLE;
INFOFILE : FILE OF TABLE;

(* store used questions here *)
USEDQ : PACKED ARRAY(0..QUESTIONS) OF INTEGER;

(* for text file listings *)
DEST : TEXT;

(* debugging flag *)
trace : boolean;

```

```

PROCEDURE LOADINDEX; FORWARD;
PROCEDURE LOADEXAMINEE(RECNUM : INTEGER); FORWARD;
PROCEDURE UPDATEEXAMINEE(RECNUM : INTEGER); FORWARD;
PROCEDURE UPDATEINDEX; FORWARD;
PROCEDURE UPDATERESULTS(RECNUM : INTEGER); FORWARD;
PROCEDURE LOADRESULTS(RECNUM : INTEGER); FORWARD;
PROCEDURE LOADINFO(RECNUM : INTEGER); FORWARD;
PROCEDURE LOADPARAMS; FORWARD;

```

```

FUNCTION GHOSTDIGIT : CHAR; FORWARD;
FUNCTION GHOSTKEY : CHAR; FORWARD;
PROCEDURE PAGE(DUMMY : CHAR); FORWARD;

```

```

PROCEDURE SQUALK; FORWARD;
FUNCTION GETCHAR(OKSET : SETOFCHAR;
                FLUSHQUE,
                ECHO,
                BEEP : BOOLEAN) : CHAR; FORWARD;
PROCEDURE FILLBUF(CHARCNT : INTEGER;
                OKSET : SETOFCHAR; ERASE : BOOLEAN); FORWARD;
PROCEDURE SCRCONTROL(I,J,K:INTEGER); FORWARD;
PROCEDURE TEXT40MODE; FORWARD;
PROCEDURE TEXT80MODE; FORWARD;
PROCEDURE INVERSE; FORWARD;
PROCEDURE NORMALSCR; FORWARD;
FUNCTION TIME : REAL; FORWARD;
PROCEDURE GWRITESTR(GSTR : STRING); FORWARD;
PROCEDURE GGOTOXY(X,Y : INTEGER); FORWARD;
PROCEDURE INITFORGRAFX; FORWARD;
PROCEDURE DELAY(SECONDS : INTEGER); FORWARD;
PROCEDURE SESSIONHEADER; FORWARD;
PROCEDURE CLOSINGMESSAGE; FORWARD;
PROCEDURE STALL; FORWARD;
PROCEDURE DECODEPRINT(BLOCKNUM, BLOCKPTR : INTEGER); FORWARD;
PROCEDURE BLANKLINES(START,COUNT,ENDCURSOR : INTEGER); FORWARD;
FUNCTION SLOT(CODE : INTEGER) : INTEGER; FORWARD;
FUNCTION HASH(KEY : INTEGER) : INTEGER; FORWARD;
FUNCTION GETINTSTR : INTEGER; FORWARD;
PROCEDURE GWRITECHR(GCHR : CHAR); FORWARD;
PROCEDURE GWRITEINT(GINT : INTEGER); FORWARD;
PROCEDURE GWRITELN; FORWARD;
PROCEDURE GSTALL; FORWARD;
FUNCTION GGETCHAR(OKSET : SETOFCHAR;
                FLUSHQUE,
                ECHO,
                BEEP : BOOLEAN) : CHAR; FORWARD;
PROCEDURE GBLANKLINES(STARTBLANK,
                BLANKTHISMANY,
                LEAVECURSOR : INTEGER); FORWARD;
PROCEDURE GFILLBUF(CHARCNT : INTEGER;
                OKSET : SETOFCHAR; ERASE : BOOLEAN); FORWARD;
PROCEDURE GDECODEPRINT(SUBTESTNUM,
                ITEMCODE : INTEGER); FORWARD;
FUNCTION GGETINTSTR : INTEGER; FORWARD;
PROCEDURE PFILLBUF(CHARCNT : INTEGER;
                OKSET : SETOFCHAR; ERASE : BOOLEAN;
                FILLFROM : INTEGER; VAR FFLOW : INTEGER); FORWARD;
PROCEDURE PSTALL(STALLFROM : INTEGER; VAR SFLOW : INTEGER); FORWARD;
FUNCTION GETCHRANSWER(CALLEDFROM : INTEGER;
                VAR PCODE : INTEGER) : CHAR; FORWARD;
FUNCTION GETINTANSWER(CALLEDFROM : INTEGER;
                VAR PCODE : INTEGER) : INTEGER; FORWARD;
PROCEDURE GETSEVENANSWERS(QSTNUM,QSTCNT,CALLEDFROM,
                GBLOCK,GPTR : INTEGER;
                VAR A7:SEVENTYPE; VAR PCODE,QACNT : INTEGER);
                FORWARD;
PROCEDURE GPFILLBUF(CHARCNT : INTEGER;
                OKSET : SETOFCHAR; ERASE : BOOLEAN;
                FILLFROM : INTEGER; VAR FFLOW : INTEGER); FORWARD;
FUNCTION GGETCHRANSWER(CALLEDFROM : INTEGER;
                VAR PCODE : INTEGER) : CHAR; FORWARD;
FUNCTION GGETINTANSWER(CALLEDFROM : INTEGER;
                VAR PCODE : INTEGER) : INTEGER; FORWARD;
PROCEDURE GGETSEVENANSWERS(QSTNUM,QSTCNT,CALLEDFROM,
                GTEST,GITEM : INTEGER;
                VAR A7:SEVENTYPE;
                VAR PCODE,QACNT : INTEGER); FORWARD;

```

```
(*****
(*)
(*)      Textfile : ADMIN.DIR/A.1UTL.TEXT      Volume : TFILES      (*)
(*)      Codefile : ADMIN.CODE ('Include' file) Volume : CATDATA    (*)
(*)
(*)
(*)
(*) File Last Modified : October 7 1983      NPROC      (*)
(*****)
```

```
FUNCTION GHOSTDIGIT;
BEGIN
  GHOSTDIGIT := CHR((RANDOM MOD 10) + 48);
END; (* ghost digit *)
```

```
FUNCTION GHOSTKEY;
VAR T : INTEGER;
    GKEY : CHAR;
BEGIN
  REPEAT
    T := RANDOM;
    T := (T MOD 5) + 1;
    CASE T OF
      1 : GKEY := 'A';
      2 : GKEY := 'B';
      3 : GKEY := 'C';
      4 : GKEY := 'D';
      5 : GKEY := 'E';
    END;
  UNTIL GKEY IN (ITEMINFO.LOWANSWER..ITEMINFO.HIGHANSWER);
  GHOSTKEY := GKEY;
END; (* ghostkey *)
```

```
FUNCTION RANDOM:REAL;
BEGIN
  RANDOM := RANDOM/MAXINT;
END;
```

```
FUNCTION PROB(THETA,A,B,C:REAL):REAL;
BEGIN
  PROB := C + (1-C) / (1 + EXP(-1.7 * A * (THETA-B)));
END;
```

```
FUNCTION NEWHOSTKEY(THETA:REAL):CHAR;
VAR
  R,P:REAL;
  ANS:INTEGER;
BEGIN
  R:=RANDOM;
  P:=PROB(THETA,ITEMINFO.A,ITEMINFO.B,ITEMINFO.C);
  IF R > P THEN
    BEGIN
      ANS := ORD(ITEMINFO.ANSWER);
      IF ANS < ORD(ITEMINFO.HIGHANSWER)
      THEN ANS := SUCC(ANS)
      ELSE ANS := PRED(ANS);
      NEWHOSTKEY := CHR(ANS);
    END
  ELSE
    NEWHOSTKEY := ITEMINFO.ANSWER;
  END;
```

```
(* clears screen and puts cursor at 0,0 *)
PROCEDURE PAGE;
BEGIN
  WRITE(CHR(28));
```

```
GOTOXY(0,0);
END; (* page *)
```

```
(* rings the bell *)
PROCEDURE SQUAWK;
BEGIN
  WRITE(CHR(BELL));
END; (* squawk *)
```

```
(* read an acceptable character from the keyboard *)
FUNCTION GETCHAR;
VAR MASK : PACKED ARRAY[0..0] OF CHAR;
    ASCII : INTEGER;
BEGIN
  IF FLUSHQUEUE THEN UNITCLEAR(2); (* flush buffer *)
  REPEAT
    UNITREAD(2,MASK,1);
    ASCII := ORD(MASK[0]);
    CASE ASCII OF
      AKEY : MASK[0] := 'A';
      BKEY : MASK[0] := 'B';
      CKEY : MASK[0] := 'C';
      DKEY : MASK[0] := 'D';
      EKEY : MASK[0] := 'E';
    END;
    IF BEEP AND NOT (MASK[0] IN OKSET) THEN SQUAWK;
  UNTIL MASK[0] IN OKSET;
  IF ECHO AND (MASK[0] IN [CHR(32)..CHR(126)])
    AND (NOT (MASK[0] IN CONTROLKEYS)) THEN
    WRITE(MASK[0]);
  GETCHAR := MASK[0];
END; (* getchar *)
```

```
(* read in a string and save in a temporary buffer *)
PROCEDURE FILLBUF;
VAR I : INTEGER;
    IDCHAR : CHAR;
BEGIN
  I := 0; (* initialize count of characters *)
  REPEAT
    IF I > (CHARCNT-1) THEN
      (* maximum char typed in/allow only backspace or return *)
      IDCHAR :=
        GETCHAR([CHR(ERASEKEY),CHR(YESKEY)],TRUE,FALSE,TRUE)
    ELSE
      BEGIN
        (* get a character *)
        IDCHAR :=
          GETCHAR(OKSET + [CHR(YESKEY),
            CHR(ERASEKEY)],
            TRUE,TRUE,TRUE);
        IF (IDCHAR IN OKSET) AND (IDCHAR <> CHR(YESKEY)) THEN
          (* save visible character *)
          BEGIN
            LINEBUF[I] := IDCHAR;
            I := I + 1;
          END;
      END;
    IF IDCHAR = CHR(ERASEKEY) THEN
      (* back space key hit *)
      BEGIN
        IF I = 0 THEN (* no character to backspace over *)
          SQUAWK
        ELSE
          BEGIN
            WRITE(CHR(LARROW)); (* move cursor back one *)
            I := I - 1; (* adjust string buffer location *)
          END;
        END;
      END;
  UNTIL IDCHAR = CHR(YESKEY);
END;
```

```

    IF ERASE THEN
      (* blank out backspaced character *)
    BEGIN
      WRITE(' ');
      WRITE(CHR(LARROW));
      LINEBUF[1] := ' ';
    END;
  END;
END;
UNTIL IDCHAR = CHR(YESKEY);
END; (* fillbuf *)

(* send control characters to screen *)
PROCEDURE SCRCONTROL;
  (* PASCAL interface to Screen Control)
  (* APPLE III Standard Device Drivers)
  (* ..... Pages 34 to 46. *)
  VAR N: INTEGER;
  G_ARRAY: PACKED ARRAY[0.. 3] OF 0..255;
  BEGIN
    G_ARRAY[0] := I; G_ARRAY[1] := J; G_ARRAY[2] := K;
    UNTIL WRITE(1,G_ARRAY,3,,12);
  END; (* scrcontrol *)

(* switch to 40 column screen *)
PROCEDURE TEXT40MODE;
  BEGIN
    SCRCONTROL(16,0,28); {Text mode 40W, followed by clearscreen.}
  END; (* text40mode *)

(* switch to 80 column screen *)
PROCEDURE TEXT80MODE;
  BEGIN
    SCRCONTROL(04,0,0); {Restore Viewport to its original condition.}
    SCRCONTROL(16,2,28); {Text Mode 80, followed by clearscreen.}
  END; (* text80mode *)

(* turn on reverse video *)
PROCEDURE INVERSE;
  BEGIN
    SCRCONTROL(18,0,0);
  END; (* inverse *)

(* restore normal console *)
PROCEDURE NORMALSCR;
  BEGIN
    SCRCONTROL(17,0,0);
  END; (* normal *)

(* returns the # seconds elapsed since start of the day *)
FUNCTION TIME;
  TYPE TIMERECD = RECORD
    S : PACKED ARRAY[1..12] OF CHAR;
  END;
  VAR HOUR,
      MINUTE,
      SECOND : REAL;

  T : TIMERECD;
  TFILE : FILE OF TIMERECD;

  BEGIN
    RESET(TFILE, '.CLOCK');
    T := TFILE^;

```

```

HOUR := ((ORD(T.S[6]) - 48.0) * 10.0) +
         (ORD(T.S[7]) - 48.0);
MINUTE := ((ORD(T.S[8]) - 48.0) * 10.0) +
          (ORD(T.S[9]) - 48.0);
SECOND := ((ORD(T.S[10]) - 48.0) * 10.0) +
          (ORD(T.S[11]) - 48.0);
TIME := (HOUR * 3600.0) + (MINUTE * 60.0) + SECOND;

```

END; (\* time \*)

(\* does a write to graphics screen for string values \*)

```

PROCEDURE GWRITESTR;
BEGIN
  UNITWRITE(3,GSTR[1],LENGTH(GSTR),0,12);
END; (* gwrtestr *)

```

(\* do a gotoxy to the graphics screen, treats graphics screen as if it \*)  
 (\* had textmode coordinates for 80 column by 24 rows. \*)

```

PROCEDURE GGOTOXY;
VAR XPOS,
    YPOS : INTEGER;
BEGIN
  XPOS := X * 7;
  YPOS := 191 - (Y * 8);
  MOVETO(XPOS,YPOS);
END; (* ggotoxy *)

```

(\* set up the grafix mode \*)

```

PROCEDURE INITFORGRAFIX;
BEGIN
  INITGRAFIX;
  GRAFIXMODE(BWS60,1);
  VIEWPORT(0,559,0,191);
  FILLCOLOR(WHITE);
  PENCOLOR(BLACK);
  FILLPORT;
END; (* initforgrafix *)

```

(\* delay, do nothing for x seconds \*)

```

PROCEDURE DELAY;
VAR START,
    STOP : REAL;
    ELAPSED : INTEGER;
BEGIN
  START := TIME;
  REPEAT
    STOP := TIME;
    ELAPSED := TRUNC(ABS(STOP - START))
  UNTIL ELAPSED >= SECONDS;
END; (* delay *)

```

(\* session header \*)

```

PROCEDURE SESSIONHEADER;
VAR SCHAR : CHAR;
BEGIN
  PAGE(OUTPUT);
  INITFORGRAFIX;
  GRAFIXON;
  GLOAD('CATDATA:CATPIC.FOTO');
  GGOTOXY(55,3);
  GWRITESTR(VERSION);
  GGOTOXY(1,23);
  GWRITESTR('Press the <YES> key to begin session ');
  if not ghost then
    begin

```

```

SCHAR :=
  GETCHAR([CHR(YESKEY),CHR(ESC)],TRUE,FALSE,TRUE);
IF SCHAR = CHR(ESC) THEN
  BEGIN
    SETCHAIN('CATDATA:CATPROJECT');
    TEXT80MODE;
    EXIT(PROGRAM);
  END;
end;

PAGE(OUTPUT);
TEXTON;

DELAY(1);

(* set normal flow *)
FLOWCODE := CONTINUE;

(* mark time at beginning of session *)
SESSSTART := TIME;

END; (* session header *)

```

```

(* session end message *)
PROCEDURE CLOSINGMESSAGE;
VAR I,J,K : INTEGER;
BEGIN
  TEXT40MODE;

  (* mark total time spent at console *)
  EXAMINEE.TOTTIMECONSOLE := TRUNC(TIME - SESSSTART);

  (* save time spent in computer orientation *)
  EXAMINEE.ORIENTATIONTIME := 0TIME;

  (* save current examinee data *)
  UPDATEEXAMINEE(ERECNUM);

  PAGE(OUTPUT);
  GOTOXY(4,9);
  WRITE('This completes the testing session. ');
  GOTOXY(13,11);
  WRITE(' Thank you. ');
  GOTOXY(6,13);
  WRITE('Please report to the proctor. ');
  DELAY(8);
  (* kill some time *)
  IF (EXAMINEE.LASTTEST <= 18) OR (DEMOFLAG) THEN
    DELAY(8);

END; (* closing message *)

```

```

(**** display a message/wait for a keystroke ***)
PROCEDURE STALL;
VAR STALLCHAR : CHAR;
BEGIN
  WRITE(' Press the <YES> key ');
  if not ghost then
    begin
      STALLCHAR :=
        GETCHAR([CHR(YESKEY),CHR(ESC)],TRUE,FALSE,TRUE);
      IF STALLCHAR = CHR(ESC) THEN
        BEGIN
          SETCHAIN('CATDATA:CATPROJECT');
          TEXT80MODE;
          EXIT(PROGRAM);
        END;
      end;
    END;
END; (* stall *)

```

```

(* reads the item text file & displays item text *)
PROCEDURE DECODEPRINT;
CONST BLOCKSOUT = 4;
VAR X,
    Y,
    B,
    CURRPTR,
    CURRBLK,
    CHARCODE,
    CHARCNT : INTEGER;

    BADIO : BOOLEAN;

(* reads a block from disk into the item ascii buffer *)
PROCEDURE READITEMBLOCK(WHICHBLOCK : INTEGER);
VAR BLOCKSTRANSFERRED,
    ERRNUM : INTEGER;

    BADIO : BOOLEAN;
BEGIN
    BADIO := FALSE;
    RESET(ITEMTEXT,TEXTNAME); (* question text *)
    BLOCKSTRANSFERRED :=
        BLOCKREAD(ITEMTEXT,TRIX.ASCIIBUF,BLOCKSOUT,WHICHBLOCK);
    BADIO := ((BLOCKSTRANSFERRED < 1) OR (IORESULT <> 0));
    ERRNUM := IORESULT;
    CLOSE(ITEMTEXT,LOCK);
    IF BADIO THEN
        BEGIN
            WRITELN;WRITELN;
            WRITE('Block read io error # ',ERRNUM);
            STALL;
            EXIT(PROGRAM);
        END;
    END;
END;

(* return the next code in ascii file *)
FUNCTION BUFCODE : INTEGER;
BEGIN
    BUFCODE := TRIX.ASCIIBUF(CURRPTR);
    CURRPTR := CURRPTR + 1;
    IF CURRPTR > MAXITEMBUF THEN
        (* end of block/get next block and reset byte ptr *)
        BEGIN
            CURRBLK := CURRBLK + BLOCKSOUT;
            READITEMBLOCK(CURRBLK);
            CURRPTR := 0;
        END;
    END;
END; (* bufcode *)

BEGIN (* decode print *)
    PAGE(OUTPUT); (* clear the screen *)
    READITEMBLOCK(BLOCKNUM);
    (* set block/byte ptrs *)
    CURRPTR := BLOCKPTR;
    CURRBLK := BLOCKNUM;
    FILLCHAR(LINEBUF(0),80,' ');
    (* read bytes from the buffer *)
    REPEAT

        (* get char from block buffer *)
        CHARCODE := BUFCODE;

        CASE CHARCODE OF
            GOTOFLAG : BEGIN (* move cursor *)

```

```

(* next two bytes after flag are x,y coord *)
X := BUFCODE;
Y := BUFCODE;
CHARCNT := BUFCODE;
IF (CURRPTR + CHARCNT - 1) > MAXITEMBUF THEN
BEGIN
  B := (MAXITEMBUF + 1) - CURRPTR;
  MOVELEFT(TRIX.ASCIIBUF [CURRPTR], LINEBUF [X], B);
  X := X + B;
  B := CHARCNT - B;
  CURRBLK := CURRBLK + BLOCKSOUT;
  READITEMBLOCK (CURRBLK);
  CURRPTR := 0;
  MOVELEFT (TRIX.ASCIIBUF [CURRPTR], LINEBUF [X], B);
  CURRPTR := CURRPTR + B;
END
ELSE
BEGIN
  MOVELEFT (TRIX.ASCIIBUF [CURRPTR], LINEBUF [X], CHARCNT);
  CURRPTR := CURRPTR + CHARCNT;
  IF CURRPTR > MAXITEMBUF THEN
  BEGIN
    CURRBLK := CURRBLK + BLOCKSOUT;
    CURRPTR := 0;
    READITEMBLOCK (CURRBLK);
  END;
  END;
  GOTOXY (0, Y);
  WRITE (LINEBUF);
  FILLCHAR (LINEBUF [0], 80, ' ');
END;
PAGEFLAG : BEGIN (* wait for keystroke to see rest of text *)
  GOTOXY (1, 21);
  STALL;
  PAGE (OUTPUT);
END;
ENDITEM : ;

END;
UNTIL CHARCODE = ENDITEM; (* until end flag hit *)
END; (* decodeprint *)

(* blank out lines *)
PROCEDURE BLANKLINES;
VAR I : INTEGER;
BEGIN
  (* begin at *)

  (* blank out so many lines *)
  FOR I := 8 TO (COUNT-1) DO
  BEGIN
    GOTOXY (0, START+I);
    IF FORTYCOLUMN THEN
      WRITE ('') (* ORIG *)
    (*AD*)
    ELSE WRITE ('');
  END;

  (* leave the cursor at this line *)
  GOTOXY (0, ENDCURSOR);
END; (* blanklines *)

(* given a question code, this function returns the location *)
(* of the question data, & text pointers. *)
FUNCTION SLOT;
VAR INDEX : INTEGER;
FOUND : BOOLEAN;
BEGIN

```

```

INDEX := MAXSAMPLES + 1;
FOUND := FALSE;
REPEAT
  IF DIRECTORY.ITEMCODE[INDEX] = CODE THEN
    FOUND := TRUE
  ELSE
    INDEX := INDEX + 1;
UNTIL (INDEX > MAXITEMPOOL) OR (FOUND);
IF FOUND THEN
  SLOT := INDEX
ELSE
  SLOT := NIL;
END; (* slot *)

```

```

(* returns record # of question data file *)
(* no collisions *)
FUNCTION HASH;
BEGIN
  HASH :=
    (CURRTEST * MAXITEMPOOL)
    + KEY + CURRTEST;
END; (* hash *)

```

```

(* read in a string representation of an integer and return integer value *)
FUNCTION GETINTSTR;
VAR PLACE,
    VALUE,
    I : INTEGER;
    PROCTCALL : BOOLEAN;
BEGIN
  FILLCHAR(LINEBUF[0],4,' ');
  proctcall := false;
  if ghost then
    value := (random mod 1000)
  else
    begin
      REPEAT
        (* read a maximum of four digits *)
        FILLBUF(4,DIGITS + (CHR(HELPKEY)),TRUE); (* read in 5 digits *)
        UNTIL LINEBUF[0] <> ' ';
        VALUE := 0;
        PLACE := 1;
        PROCTCALL := FALSE;
        I := 3;

        (* convert string to integer *)
        REPEAT
          IF LINEBUF[I] IN DIGITS THEN
            BEGIN
              VALUE := VALUE + ((ORD(LINEBUF[I]) - ASCII(OFFSET)) * PLACE);
              PLACE := PLACE * 10;
            END
          ELSE
            IF LINEBUF[I] = CHR(HELPKEY) THEN
              PROCTCALL := TRUE;
              I := I - 1;
            UNTIL (I < 0) OR (PROCTCALL);
            FILLCHAR(LINEBUF[0],4,' ');
        end;

        (* if proctor was called during key in then flag it *)
        IF PROCTCALL THEN
          GETINTSTR := NIL
        ELSE
          GETINTSTR := VALUE;
        END; (* getintstr *)
      end;
    end;

```

(\* does a write to graphics screen for char values \*)

```
PROCEDURE GWRITECHR;
VAR C : STRING;
BEGIN
  C := ' ';
  C[1] := GCHR;
  UNITWRITE(3,C[1],1,0,12);
END; (* gwritechr *)
```

(\* does a write to graphics screen for integer values \*)

```
PROCEDURE GWRITEINT;
VAR X,Z : INTEGER;
    DIGITSTR,STR : STRING;
    NEGATIVE : BOOLEAN;
    C : CHAR;
BEGIN
  NEGATIVE := FALSE;
  Z := GINT;
  IF GINT < 0 THEN
    BEGIN
      NEGATIVE := TRUE;
      Z := -GINT;
    END;
  DIGITSTR := ' ';
  STR := '';
  REPEAT
    X := Z MOD 10;
    C := CHR(X+48);
    DIGITSTR[1] := C;
    STR := CONCAT(DIGITSTR,STR);
    Z := Z DIV 10;
  UNTIL Z <= 0;
  IF NEGATIVE THEN
    STR := CONCAT('-',STR);
  UNITWRITE(3,STR[1],LENGTH(STR),0,12);
END; (* gwriteint *)
```

(\* do a writeln to the graphics screen \*)

```
PROCEDURE GWRITELN;
BEGIN
  MOVETO(0,YLOC-8);
END; (* gwriteln *)
```

(\* does a stall to the graphics screen \*)

```
PROCEDURE GSTALL;
BEGIN
  GWRITESTR('Press the <YES> key ');
  if not ghost then
    IF GETCHAR(CHR(YESKEY)),TRUE,FALSE,TRUE) = CHR(YESKEY) THEN;
END; (* gstall *)
```

(\* graphics equivalent of the procedure getchar \*)

```
FUNCTION GGETCHAR;
VAR MASK : PACKED ARRAY[0..0] OF CHAR;
    M : STRING;
    ASCII : INTEGER;
BEGIN
  M := ' ';
  IF FLUSHQUEUE THEN UNITCLEAR(2);
  REPEAT
    UNITREAD(2,MASK,1);
    ASCII := ORD(MASK[0]);
  CASE ASCII OF
    AKEY : MASK[0] := 'A';
    BKEY : MASK[0] := 'B';
    CKEY : MASK[0] := 'C';
    DKEY : MASK[0] := 'D';
    EKEY : MASK[0] := 'E';
```

```

END;
IF BEEP AND NOT (MASK(0) IN OKSET) THEN SQUAWK;
UNTIL MASK(0) IN OKSET;
IF ECHO AND (MASK(0) IN (CHR(32)..CHR(126))) AND
  (NOT (MASK(0) IN CONTROLKEYS)) THEN
BEGIN
  M(1) := MASK(0);
  UNITWRITE(3,M(1),1,0,12);
END;
GGETCHAR := MASK(0);
END; (* ggetchar *)

```

```

(* blanklines on the graphics screen, treat as if in textmode *)
PROCEDURE GBLANKLINES;
VAR TOP,
    BOTTOM : INTEGER;
BEGIN
  TOP := 191 - (STARTBLANK * 8);
  BOTTOM := 191 - ((STARTBLANK + BLANKTHISMANY) * 8);
  VIEWPORT(0,559,BOTTOM,TOP);
  FILLPORT;
  VIEWPORT(0,559,0,191);
  GGOTOXY(0,LEAVECURSOR);
END; (* gblanklines *)

```

```

(* read in a string and save in temporary buffer, graphics version *)
PROCEDURE GFILLBUF;
VAR I : INTEGER;
    IDCHAR : CHAR;
    B : STRING;
BEGIN
  B := ' ';
  I := 0;
  REPEAT
    IF I > (CHARCNT - 1) THEN
      (* maximum char typed in/allow only backspace or return *)
      IDCHAR :=
        GGETCHAR((CHR(ERASEKEY),CHR(YESKEY)),TRUE,FALSE,TRUE)
    ELSE
      BEGIN
        (* get a character *)
        IDCHAR :=
          GGETCHAR(OKSET + (CHR(ERASEKEY),CHR(YESKEY)),TRUE,FALSE,TRUE);
        IF (IDCHAR IN OKSET) AND (IDCHAR <> CHR(YESKEY)) THEN
          (* save visible character *)
          BEGIN
            GWRITECHR(IDCHAR);
            LINEBUF[I] := IDCHAR;
            I := I + 1;
          END;
        END;
      END;
    IF IDCHAR = CHR(ERASEKEY) THEN
      (* backspace key hit *)
      BEGIN
        IF I = 0 THEN
          SQUAWK
        ELSE
          BEGIN
            (* move cursor back one space *)
            MOVETO(XLOC-7,YLOC);
            I := I - 1;
            IF ERASE THEN
              (* blank out backspaced character *)
              BEGIN
                UNITWRITE(3,B(1),1,0,12);
                MOVETO(XLOC-7,YLOC);
                LINEBUF[I] := ' ';
              END;
            END;
          END;
        END;
      END;

```

```

END;
UNTIL (DCHAR = CHR(YESKEY));
END; (* gfillbuf *)

```

```

(* display question to graphics screen *)
PROCEDURE GDECODEPRINT;
VAR X,Z : INTEGER;
    VNAME,FNAME,DIGITSTR,STR : STRING;
    C : CHAR;

```

```

(* reads the item text file and displays the graphics *)
PROCEDURE DECODEGRAF;
VAR X,
    Y,
    X1,Y1,
    CURRPTR,
    CURRBLK,
    DOTCNT : INTEGER;

```

```

(* reads a block from disk into the item ascii buffer *)
PROCEDURE READITEMBLOCK(WHICHBLOCK : INTEGER);
VAR BLOCKSTRANSFERRED : INTEGER;
    BADIO : BOOLEAN;
BEGIN
    BADIO := FALSE;
    RESET(ITEMTEXT,FNAME);
    BLOCKSTRANSFERRED := BLOCKREAD(ITEMTEXT,TRIX.ITEMBUF,4,WHICHBLOCK);
    BADIO := ((BLOCKSTRANSFERRED < 4) OR (IORESULT <> 0));
    CLOSE(ITEMTEXT,LOCK);
    IF BADIO THEN
        BEGIN
            WRITELN;
            WRITELN;
            WRITE(' Block ', WHICHBLOCK, ' write error. ');
            WRITELN;
            READLN;
            EXIT(PROGRAM);
        END;
    END;
END; (* readitemblock *)

```

```

(* reads the item text file & displays item text *)
PROCEDURE DECODEPRINT;
VAR X,
    Y,
    BYTECNT,
    CHARCODE : INTEGER;

```

```

(* return the next code in ascii file *)
FUNCTION BUFCODE : INTEGER;
BEGIN
    BUFCODE := TRIX.ASCIIBUF(CURRPTR);
    CURRPTR := CURRPTR + 1;
    IF CURRPTR > 2047 THEN
        (* end of block/get next block and reset byte ptr *)
        BEGIN (1)
            CURRBLK := CURRBLK + 4;
            READITEMBLOCK(CURRBLK);
            CURRPTR := 0;
        END; (1)
    END;
END; (* bufcodes *)

```

```

BEGIN (* decode print *)
    (* read bytes from the buffer *)
    REPEAT

```

```

(* get char from block buffer *)
CHARCODE := BUFCODE;

CASE CHARCODE OF
  GOTOFLAG : BEGIN (1)      (* move cursor *)
                (* next two bytes after flag are x,y coord *)
                X := BUFCODE;
                Y := BUFCODE;
                BYTECNT := BUFCODE;
                GGOTOXY(X,Y);
              END; (1)
  ENDITEM : ;

END;

IF (CHARCODE >= 32) AND (CHARCODE <= 126) THEN
  GWRITECHR(CHR(CHARCODE));

UNTIL CHARCODE = ENDITEM; (* until end flag hit *)
END; (* decodeprint *)

```

```

BEGIN (* decode graf *)

  READITEMBLOCK(0);

  CURRBLK := 0;
  CURRPTR := 0;

  (* decode the xlines *)
  REPEAT
    IF CURRPTR > 1021 THEN
      (* end of block/get new block *)
      BEGIN
        CURRBLK := CURRBLK + 4;
        READITEMBLOCK(CURRBLK);
        CURRPTR := 0;
      END;
    X := TRIX.ITEMBUF(CURRPTR);
    IF X >= 0 THEN
      BEGIN
        Y := TRIX.ITEMBUF(CURRPTR + 1);
        MOVETO(X,Y);
        DOTCNT := TRIX.ITEMBUF(CURRPTR + 2);
        LINEREL(DOTCNT,0);
        CURRPTR := CURRPTR + 3;
      END;
    UNTIL X < 0;

    CURRPTR := CURRPTR + 1;

  (* decode the ylines *)
  REPEAT
    IF CURRPTR > 1021 THEN
      (* end of block/get new block *)
      BEGIN
        CURRBLK := CURRBLK + 4;
        READITEMBLOCK(CURRBLK);
        CURRPTR := 0;
      END;
    X := TRIX.ITEMBUF(CURRPTR);
    IF X >= 0 THEN
      BEGIN
        Y := TRIX.ITEMBUF(CURRPTR + 1);
        MOVETO(X,Y);
        DOTCNT := TRIX.ITEMBUF(CURRPTR + 2);
        LINEREL(0,DOTCNT);
        CURRPTR := CURRPTR + 3;
      END;
    UNTIL X < 0;

    CURRPTR := CURRPTR + 1;
  END;

```

```

UNTIL X < 0;
CURRPTR := CURRPTR + 1;

(* decode the diagonals *)
REPEAT
  IF CURRPTR > 1020 THEN
    (* end of block/get new block *)
    BEGIN
      CURRBLK := CURRBLK + 4;
      READITEMBLOCK(CURRBLK);
      CURRPTR := 0;
    END;
  X := TRIX.ITEMBUF(CURRPTR);
  IF X >= 0 THEN
    BEGIN
      Y := TRIX.ITEMBUF(CURRPTR + 1);
      X1 := TRIX.ITEMBUF(CURRPTR + 2);
      Y1 := TRIX.ITEMBUF(CURRPTR + 3);
      MOVETO(X,Y);
      LINETO(X1,Y1);
      CURRPTR := CURRPTR + 4;
    END;
  UNTIL X < 0;

  CURRPTR := CURRPTR + 1;

  (* decode the dots *)
  REPEAT
    IF CURRPTR > 1022 THEN
      (* end of block/get new block *)
      BEGIN
        CURRBLK := CURRBLK + 4;
        READITEMBLOCK(CURRBLK);
        CURRPTR := 0;
      END;
    X := TRIX.ITEMBUF(CURRPTR);
    IF X >= 0 THEN
      BEGIN
        Y := TRIX.ITEMBUF(CURRPTR + 1);
        DOTAT(X,Y);
        CURRPTR := CURRPTR + 2;
      END;
    UNTIL X < 0;

    CURRPTR := CURRPTR + 1;
    CURRPTR := CURRPTR * 2;

  DECODEPRINT;

END;  (* decodegraf *)

BEGIN
  FILLPORT;
  GRAFIXON;
  DIGITSTR := ' ';
  STR := '';
  Z := ITEMCODE;
  REPEAT
    X := Z MOD 10;
    C := CHR(X+48);
    DIGITSTR(1) := C;
    STR := CONCAT(DIGITSTR,STR);
    Z := Z DIV 10;
  UNTIL Z <= 0;
  DIGITSTR(1) := CHR(SUBTESTNUM+65);
  C := DIGITSTR(1);
  IF SAMPLEQUESTION THEN
    BEGIN
      FNAME := CONCAT('/CATFOTO/',DIGITSTR,'DIR/G',DIGITSTR,'SQ',STR,'.FOTO');
      GLOAD(FNAME);
    END;
  END;

```

```

END
ELSE
  IF ITEMINFO.DUMMY1 = COMPRESSED THEN
    BEGIN
      FNAME := CONCAT('/CATFOTO/',DIGITSTR,'DIR/G',DIGITSTR,STR,'.DATA');
      DECODEGRAF;
    END
  ELSE
    BEGIN
      FNAME := CONCAT('/CATFOTO/',DIGITSTR,'DIR/G',DIGITSTR,'Q',STR,'.FOTO');
      GLOAD(FNAME);
    END;
  END;
END; (* gdecodeprint *)

(* read in a string representation of an integer and return integer value *)
FUNCTION GGETINTSTR;
VAR PLACE,
    VALUE,
    I : INTEGER;
    PROCTCALL : BOOLEAN;
BEGIN
  FILLCHAR(LINEBUF[0],4,' ');
  proctcall := false;
  if ghost then
    value := (random mod 1000)
  else
    begin
      REPEAT
        (* read a maximum of four digits *)
        GFILLBUF(4,DIGITS + [CHR(HELPKEY)],TRUE); (* read in 5 digits *)
      UNTIL LINEBUF[0] <> ' ';
      VALUE := 0;
      PLACE := 1;
      PROCTCALL := FALSE;
      I := 3;

      (* convert string to integer *)
      REPEAT
        IF LINEBUF[I] IN DIGITS THEN
          BEGIN
            VALUE := VALUE + ((ORD(LINEBUF[I]) - ASCIIOFFSET) * PLACE);
            PLACE := PLACE * 10;
          END
        ELSE
          IF LINEBUF[I] = CHR(HELPKEY) THEN
            PROCTCALL := TRUE;
            I := I - 1;
          UNTIL (I < 0) OR (PROCTCALL);
          FILLCHAR(LINEBUF[0],4,' ');
        end;

      (* if proctor was called during key in then flag it *)
      IF PROCTCALL THEN
        GGETINTSTR := NIL
      ELSE
        GGETINTSTR := VALUE;
      END; (* ggetintstr *)

    end;

  (* initializes the cat system *)
  PROCEDURE INITCAT;
  TYPE DATE = RECORD
    MONTH,
    DAY,
    YEAR : PACKED ARRAY[0..1] OF CHAR;
  END;

```

```

VAR CATDATE : DATE;
    FILEDATE : FILE OF DATE;

    DATEOK : BOOLEAN;

BEGIN
    PAGE(OUTPUT);
    trace := false;
    DIGITS := ['0'..'9'];
    CONTROLKEYS := [CHR(HELPKEY),CHR(NOKEY),CHR(YESKEY),CHR(ERASEKEY)];
    KEYPAD := DIGITS + CONTROLKEYS;
    RANDOMIZE;
    GRAFIX := FALSE;
    INITFORGRAFIX;
    FORTYCOLUMN := TRUE;
    REVERSEVIDEO := TRUE;
    DEMOFLAG := TRUE;
    SKIP := FALSE;
    SKIPFAM := FALSE;
    ghost := false;
    ABLOOP := MINGTHETA;
    RIGHT := TRUE;
    TEXTON;
    TEXT40MODE;
    INVERSE;

    (* get system set up/configuration *)
    LOADPARAMS;

    (* get the system date *)
    RESET(FILEDATE,'CATDATA:CATDATE.DATA');
    SEEK(FILEDATE,0);
    GET(FILEDATE);
    CATDATE := FILEDATE^;
    DATEOK := FALSE;
    REPEAT
        PAGE(OUTPUT);
        GOTOXY(1,9);
        WRITELN('The CAT System Date is ',CATDATE.MONTH,' / ',
            CATDATE.DAY,' / ',
            CATDATE.YEAR);

        WRITELN;
        WRITELN(' Do you want to change the date ?');
        WRITE(' Press <YES> or <NO> : ');
        IF (GETCHAR([CHR(YESKEY),CHR(NOKEY)],TRUE,TRUE,TRUE) = CHR(NOKEY)) THEN
            DATEOK := TRUE
        ELSE
            BEGIN
                WRITELN;
                WRITELN;
                WRITE(' Enter month, then press <YES> : ');
                FILLCHAR(LINEBUF(0),2,' ');
                FILLBUF(2,DIGITS,TRUE);
                MOVELEFT(LINEBUF(0),CATDATE.MONTH(0),2);
                WRITELN;
                WRITE(' Enter the day, then press <YES> : ');
                FILLCHAR(LINEBUF(0),2,' ');
                FILLBUF(2,DIGITS,TRUE);
                MOVELEFT(LINEBUF(0),CATDATE.DAY(0),2);
                WRITELN;
                WRITE(' Enter the year, then press <YES> : ');
                FILLCHAR(LINEBUF(0),2,' ');
                FILLBUF(2,DIGITS,TRUE);
                MOVELEFT(LINEBUF(0),CATDATE.YEAR(0),2);
            END;
    UNTIL DATEOK;
    SEEK(FILEDATE,0);
    FILEDATE^ := CATDATE;
    PUT(FILEDATE);
    CLOSE(FILEDATE,LOCK);
    MOVELEFT(CATDATE.MONTH(0),SYSTEMDATE(0),2);
    MOVELEFT(CATDATE.DAY(0),SYSTEMDATE(2),2);
    MOVELEFT(CATDATE.YEAR(0),SYSTEMDATE(4),2);

```

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END; (\* initcat \*)

```

(*****)
(*)
(*)      Textfile : ADMIN.DIR/A.2UTL.TEXT      Volume : TFILES      (*)
(*)      Codefile : ADMIN.CODE ('include' file) Volume : CATDATA      (*)
(*)
(*****)
(*) File Last Modified : AUG 16, 1983      NPRDC      (*)
(*****)

(*) Read in a string and save in a temporary buffer can specify maximum char *)
(*) you can type in. 'Help' key is 'live'. If someone types the help-key in *)
(*) any part of string, control passed to the proctor and code is passed back *)
(*) to control further flow. *)

PROCEDURE PFillBuf;
VAR I,
    FILLCODE : INTEGER;
    IDCHAR : CHAR;
BEGIN
    I := 0; (* initialize count of characters *)
    REPEAT
        IF I > (CHARCNT-1)
            THEN
                BEGIN (1)
                    (* maximum char typed in/allow only backspace or return *)
                    IDCHAR :=
                        GETCHAR([CHR(HELPKEY),CHR(ERASEKEY),CHR(YESKEY)],TRUE,FALSE,TRUE);

                    (* helpkey pressed *)
                    IF IDCHAR = CHR(HELPKEY)
                        THEN
                            BEGIN (2)
                                FILLCODE := 1;
                                CALLPROCT(FILLFROM,FILLCODE);

                                (* pass back negative flowcode if proctor called *)
                                FFLOW := -FILLCODE;
                                EXIT(PFillBuf);
                            END; (2)
                        END; (1)
                    ELSE
                        BEGIN (3)
                            (* get a character *)
                            IDCHAR :=
                                GETCHAR(OKSET + [CHR(HELPKEY),CHR(YESKEY),
                                    CHR(ERASEKEY)], TRUE, TRUE, TRUE);
                            IF IDCHAR = CHR(HELPKEY)
                                THEN
                                    BEGIN (4)
                                        FILLCODE := 1;
                                        CALLPROCT(FILLFROM,FILLCODE);

                                        (* passback negative flowcode to signal proctor call *)
                                        FFLOW := -FILLCODE;
                                        EXIT(PFillBuf);
                                    END; (4)
                                IF (IDCHAR IN OKSET) AND (IDCHAR <> CHR(YESKEY))
                                    THEN
                                        (* save visible character *)
                                        BEGIN (5)
                                            LINEBUF[I] := IDCHAR;
                                            I := I + 1;
                                        END; (5)
                                    END; (3)
                                IF IDCHAR = CHR(ERASEKEY)
                                    THEN
                                        (* back space key hit *)
                                        BEGIN (6)
                                            IF I = 0
                                                THEN SQUAWK (* no character to backspace over *)
                                            ELSE
                                                BEGIN (7)
                                                    WRITE(CHR(LARROW)); (* move cursor back one *)

```

```

        I := I - 1;          (* adjust string buffer location *)
        IF ERASE
        THEN
            (* blank out backspaced character *)
            BEGIN (8)
                WRITE(' ');
                WRITE(CHR(LARROW));
                LINEBUF[I] := ' ';
            END; (8)
        END; (7)
    END; (6)
UNTIL IDCHAR = CHR(YESKEY);
END; (* pfillbuf *)

[-----]

(* Display a message/wait for a keystroke. Helpkey is 'live'. Call proctor *)
(* if pressed. *)

PROCEDURE PSTALL;
VAR STALLCHAR : CHAR;
    STALLCODE : INTEGER;
BEGIN
    WRITE(' Press the <YES> key ');
    IF NOT GHOST
    THEN
        BEGIN (1)
            STALLCHAR :=
                GETCHAR([CHR(HELPKEY),CHR(YESKEY),CHR(ESC)],TRUE,FALSE,TRUE);
            IF STALLCHAR = CHR(ESC)
            THEN
                BEGIN (2)
                    SETCHAIN('CATDATA:CATPROJECT');
                    TEXT80MODE;
                    EXIT(PROGRAM);
                END; (2)
            IF STALLCHAR = CHR(HELPKEY)
            THEN
                BEGIN (3)
                    STALLCODE := 1;
                    CALLPROCTOR(STALLFROM,STALLCODE);

                    (* pass back the negative of the flow code to *)
                    (* signal that the help key was pressed. *)
                    SFLOW := -STALLCODE;
                END; (3)
            END; (1)
        END; (* stall *)

[-----]

(* Get the character response of a multiple choice question *)
FUNCTION GETCHRANSWER;
VAR CHARSELECT : CHAR;
    OK : BOOLEAN;
    GCODE : INTEGER;
    PCRENUM : BOOLEAN;
BEGIN
    OK := FALSE;
    PCRENUM := (CURRTEST=4) OR (CURRTEST=6);
    IF PCRENUM
    THEN GOTOXY(0,23)
    ELSE
        GOTOXY(0,21);
    REPEAT
        REPEAT
            WRITE(' Please enter your answer : ');
            IF GHOST THEN
                BEGIN
                    IF GHOSTFLOW = OLD
                    THEN
                        CHARSELECT := GHOSTKEY

```

```

ELSE
BEGIN
  IF GHOSTFLOW = AUTO THEN
    GTHETA := ABLOOP;
  CHARSELECT := NEWHOSTKEY(GTHETA);
END;
ELSE
  IF CURRSTRAT = TIMED THEN (* dont flush the buffer or beep *)
    CHARSELECT := GGETCHAR([ITEMINFO.LOWANSWER..ITEMINFO.HIGHANSWER,
      CHR(HELPKEY)], FALSE, FALSE, FALSE)
  ELSE
    CHARSELECT := GGETCHAR([ITEMINFO.LOWANSWER..ITEMINFO.HIGHANSWER,
      CHR(HELPKEY)], TRUE, FALSE, TRUE);
  IF CHARSELECT = CHR(HELPKEY)
  THEN
    BEGIN (1)
      GCODE := 1;
      CALLPROCTOR(CALLEDFROM, GCODE);

      (* pass back negative flow code if proctor was called *)
      PCODE := -GCODE;
      EXIT(GETCHRANSWER);
    END; (1)
  IF PCRECNUM THEN
    BLANKLINES(23,1,23)
  ELSE
    BLANKLINES(21,1,21);
  UNTIL CHARSELECT <> CHR(HELPKEY);
  IF PCRECNUM
  THEN
    BEGIN
      WRITE(' Your response was ', CHARSELECT);
      WRITE(' Do you want this answer? ');
    END
  ELSE
    BEGIN
      WRITELN(' Your response was ', CHARSELECT);
      WRITELN;
      WRITE(' Do you want this answer? ');
    END;
  IF GHOST
  THEN OK := TRUE
  ELSE
    BEGIN (2)
      IF GETCHAR([CHR(YESKEY), CHR(NOKEY)], TRUE, FALSE, TRUE) = CHR(NOKEY)
      THEN
        BEGIN
          IF PCRECNUM
          THEN BLANKLINES(23,1,23)
          ELSE
            BLANKLINES(21,3,21);
        END
      ELSE OK := TRUE;
    END; (2)
  UNTIL OK;
  GETCHRANSWER := CHARSELECT;
END; (* getchranswer *)

(-----)

(* get the integer response to a question *)
FUNCTION GETINTANSWER;
VAR GCODE,
    INTSELECT : INTEGER;
    OK : BOOLEAN;
BEGIN (Getintanswer)
  OK := FALSE;
  GOTOXY(0,21);
  REPEAT
    WRITE(' Please enter your answer : ');
    INTSELECT := GETINTSTR;
    IF INTSELECT < 0

```

```

THEN
  BEGIN (1)
    GCODE := 1;
    CALLPROCTOR (CALLEDFROM,GCODE);

    (* pass back negative flowcode to signal proctor call *)
    PCODE := -GCODE;
    EXIT (GETINTANSWER);
  END; (1)
  BLANKLINES (21,1,21);
  UNTIL INTSELECT >= 0;
  GETINTANSWER := INTSELECT;
END; (* getintanswer *)

{-----}

(* Get seven responses at once, this is for the subtest "coding speed" *)
(* and others. *)
PROCEDURE GETSEVENANSWERS;
VAR ONECHAR : CHAR;
    OK : BOOLEAN;
    ETIME,
    GCODE,
    I : INTEGER;
    STARTCLOCK,
    STOPCLOCK : REAL;
BEGIN
  I := 0;
  ETIME := 0;
  REPEAT
    I := I + 1;
    OK := FALSE;
    BLANKLINES (21,3,21);
    STARTCLOCK := TIME;
    REPEAT
      REPEAT
        WRITE (' Enter your answer for question ',QSTNUM+I-1,' : ');
        IF GHOST THEN
          ONECHAR := GHOSTKEY
        ELSE
          IF CURRSTRAT = TIMED THEN (* dont flush buffer *)
            ONECHAR := GETCHAR ((ITEMINFO.LOWANSWER..ITEMINFO.HIGHANSWER,
                                CHR(HELPKEY)), FALSE, FALSE, FALSE)
          ELSE
            ONECHAR := GETCHAR ((ITEMINFO.LOWANSWER..ITEMINFO.HIGHANSWER,
                                CHR(HELPKEY)), TRUE, FALSE, TRUE);
          IF ONECHAR = CHR(HELPKEY)
            THEN
              BEGIN (1)
                GCODE := 1;
                CALLPROCTOR (CALLEDFROM,GCODE);
                PCODE := -GCODE;

                (* Exit if leaving subtest and not returning *)
                (* or if just answering a sample. *)
                IF ((GCODE > 3) AND (GCODE <> 6)) OR
                  ((GCODE = 6) AND (SAMPLEQUESTION))
                  THEN EXIT (GETSEVENANSWERS);

                (* Else, display the question again and examinee *)
                (* must answer it before leaving. *)
                DECODEPRINT (GBLOCK,GPTR);
              END; (1)
            BLANKLINES (21,1,21);
            UNTIL ONECHAR <> CHR(HELPKEY);
            WRITELN (' Your response for question ',QSTNUM+I-1,' was ',ONECHAR);
            WRITELN;
            WRITE (' Do you want this answer? ');
            IF GHOST
              THEN OK := TRUE
            ELSE
              BEGIN (2)
                IF GETCHAR ((CHR(YESKEY),CHR(YESKEY)), FALSE, FALSE, FALSE) =

```

CHR(NOKEY)

```

        THEN BLANKLINES(21,3,21)
        ELSE OK := TRUE;
    END; (2)
UNTIL OK;
A7[1] := ONECHAR; (* a7 is a variable parameter *)
IF NOT SAMPLEQUESTION THEN
    BEGIN (3)
        STOPCLOCK := TIME;
        ETIME := ETIME + (TRUNC(ABS(STOPCLOCK - STARTCLOCK)));
        IF (ELAPSEDTIME + ETIME) >= MAXTIME
            THEN TIMEOUT := TRUE;
        END; (3)
    UNTIL (1 = QSTCNT) OR (TIMEOUT);

    IF NOT SAMPLEQUESTION THEN PAGE(OUTPUT);

    (* pass back # of questions answered *)
    IF TIMEOUT
        THEN QACNT := 0 (* throw away all questions if timeout occurred *)
        ELSE QACNT := 1;
    PCODE := 1; (* signal that answer is valid *)
    END; (* getsevenanswers *)

    {-----}

    (* Read a string and save in a temporary buffer. Can specify maximum char *)
    (* you can type in. Help key is 'live'. If someone types helpkey in any *)
    (* part of string, control passed to proctor and code is passed back to *)
    (* control further flow. *)
    PROCEDURE GPFILLBUF;
    VAR I;
        FILLCODE : INTEGER;
        IDCHAR : CHAR;
        B : STRING;
    BEGIN
        B := ' ';
        I := 0; (* initialize count of characters *)
        REPEAT
            IF I > (CHARCNT-1)
                THEN
                    BEGIN (1)
                        (* maximum char typed in/allow only backspace or return *)
                        IDCHAR :=
                            GETCHAR((CHR(HELPKEY),CHR(ERASEKEY),CHR(YESKEY)),TRUE,FALSE,TRUE);

                        (* helpkey pressed *)
                        IF IDCHAR = CHR(HELPKEY)
                            THEN
                                BEGIN (2)
                                    FILLCODE := 1;
                                    CALLPROCT(FILLFROM,FILLCODE);

                                    (* pass back negative flowcode if proctor called *)
                                    FFLOW := -FILLCODE;
                                    EXIT(GPFILLBUF);
                                END; (2)
                            END; (1)
                        ELSE
                            BEGIN (3)
                                (* get a character *)
                                IDCHAR :=
                                    GETCHAR(OKSET + (CHR(HELPKEY),CHR(YESKEY),
                                        CHR(ERASEKEY)), TRUE, FALSE, TRUE);
                                IF IDCHAR = CHR(HELPKEY)
                                    THEN
                                        BEGIN (4)
                                            FILLCODE := 1;
                                            CALLPROCT(FILLFROM,FILLCODE);

                                            (* passback negative flowcode to signal proctor call *)
                                            FFLOW := -FILLCODE;

```

```

        EXIT(GPFILLBUF);
    END; (4)
    IF (IDCHAR IN OKSET) AND (IDCHAR <> CHR(YESKEY))
    THEN
        (* save visible character *)
        BEGIN (5)
            GWRITECHR(IDCHAR);
            LINEBUF[I] := IDCHAR;
            I := I + 1;
        END; (5)
    END; (3)
    IF IDCHAR = CHR(ERASEKEY)
    THEN
        (* back space key hit *)
        BEGIN (6)
            IF I = 0
            THEN SQUAWK (* no character to backspace over *)
            ELSE
                BEGIN (7)
                    MOVETO(XLOC-7,YLOC); (* move cursor back one *)
                    I := I - 1; (* adjust string buffer location *)
                    IF ERASE
                    THEN
                        (* blank out backspaced character *)
                        BEGIN (8)
                            UNITWRITE(3,8[I],1,0,12);
                            MOVETO(XLOC-7,YLOC);
                            LINEBUF[I] := ' ';
                        END; (8)
                    END; (7)
                END; (6)
            UNTIL IDCHAR = CHR(YESKEY);
        END; (* gpfillbuf *)

    {-----}

    (* get the character response of a multiple choice question *)
    FUNCTION GGETCHRANSWER;
    VAR CHARSELECT : CHAR;
    OK : BOOLEAN;
    GCODE : INTEGER;
    BEGIN
        OK := FALSE;
        GGOTOXY(0,21);
        REPEAT
            REPEAT
                GWRITESTR(' Please enter your answer : ');
                IF GHOST
                THEN
                    BEGIN
                        IF GHOSTFLOW = OLD
                        THEN CHARSELECT := GHOSTKEY
                        ELSE
                            BEGIN
                                IF GHOSTFLOW = AUTO
                                THEN GTHETA:=ABLOOP;
                                CHARSELECT:= NEWGHOSTKEY(GTHETA);
                            END;
                        END
                    ELSE CHARSELECT := GETCHAR([ITEMINFO.LOWANSWER..ITEMINFO.HIGHANSWER,
                        CHR(HELPKEY)], TRUE, FALSE, TRUE);
                IF CHARSELECT = CHR(HELPKEY)
                THEN
                    BEGIN (1)
                        GCODE := 1;
                        CALLPROCTOR(CALLEDFROM,GCODE);

                        (* pass back negative flow code if proctor was called *)
                        PCODE := -GCODE;
                        EXIT(GGETCHRANSWER);
                    END; (1)
                    GBLANKLINES(21,1,21);
                UNTIL CHARSELECT <> CHR(HELPKEY);

```

```

GWRITESTR(' Your response was ');
GWRITECHR(CHARSELECT);
GWRITELN;
GWRITELN;
GWRITESTR(' Do you want this answer? ');
IF GHOST
  THEN OK := TRUE
  ELSE
    BEGIN (2)
      IF GGETCHAR((CHR(YESKEY),CHR(NOKEY)), TRUE, FALSE, TRUE) =
                                                CHR(NOKEY)
      THEN GBLANKLINES(21,3,21)
      ELSE OK := TRUE;
    END; (2)
UNTIL OK;
GGETCHRANSWER := CHARSELECT;
END; (* ggetchranswer *)

{-----}

(* get the integer response to a question *)
FUNCTION GGETINTANSWER;
VAR GCODE,
    INTSELECT : INTEGER;
    OK : BOOLEAN;
BEGIN
  OK := FALSE;
  GGOTOXY(0,21);
  REPEAT
    GWRITESTR(' Please enter your answer : ');
    INTSELECT := GGETINTSTR;
    IF INTSELECT < 0
      THEN
        BEGIN (1)
          GCODE := 1;
          CALLPROCTOR(CALLEDFROM,GCODE);

          (* pass back negative flowcode to signal proctor call *)
          PCODE := -GCODE;
          EXIT(GGETINTANSWER);
        END; (1)
    GBLANKLINES(21,1,21);
  UNTIL INTSELECT >= 0;
  GGETINTANSWER := INTSELECT;
END; (* ggetintanswer *)

{-----}

(* get seven responses at once, this is for the subtest "coding speed" *)
(* and others. *)
PROCEDURE GGETSEVENANSWERS;
VAR ONECHAR : CHAR;
    OK : BOOLEAN;
    ETIME,
    GCODE,
    I : INTEGER;
    STARTCLOCK,
    STOPCLOCK : REAL;
BEGIN
  I := 0;
  ETIME := 0;
  REPEAT
    I := I + 1;
    OK := FALSE;
    GBLANKLINES(21,3,21);
    STARTCLOCK := TIME;
    REPEAT
      GWRITESTR(' Enter your answer for question ');
      GWRITEINT(OSTNUM+I-1);
      GWRITESTR(' : ');
      IF GHOST
        THEN ONECHAR := GHOSTKEY

```

```

ELSE ONECHAR := GGETCHAR((ITEMINFO.LOWANSWER..ITEMINFO.HIGHANSWER,
                           CHR(HELPKEY)), TRUE, FALSE, TRUE);
IF ONECHAR = CHR(HELPKEY)
THEN
  BEGIN (1)
    GCODE := 1;
    CALLPROCTOR(CALLEDFROM,GCODE);
    PCODE := -GCODE;

    (* exit if leaving subtest and not returning *)
    (* or if we are just answering a sample. *)
    IF (GCODE > 3) AND (GCODE <> 6)
    THEN EXIT(GGETSEVENANSWERS);

    (* else display the question again and examinee *)
    (* must answer it before leaving. *)
    GDECODEPRINT(GTEST,GITEM);
  END; (1)
  GBLANKLINES(21,1,21);
  UNTIL ONECHAR <> CHR(HELPKEY);
  GWRITESTR(' Your response for question ');
  GWRITEINT(QSTNUM+1-1);
  GWRITESTR(' was ');
  GWRITECHR(ONECHAR);
  GWRITELN;
  GWRITELN;
  GWRITESTR(' Do you want this answer? ');
  IF GHOST
  THEN OK := TRUE
  ELSE
    BEGIN (2)
      IF GGETCHAR((CHR(YESKEY),CHR(NOKEY)), TRUE, FALSE, TRUE) =
                                                CHR(NOKEY)
      THEN GBLANKLINES(21,3,21)
      ELSE OK := TRUE;
    END; (2)
  UNTIL OK;
  A7[I] := ONECHAR; (* a7 is a variable parameter *)
  IF NOT SAMPLEQUESTION
  THEN
    BEGIN (3)
      STOPCLOCK := TIME;
      ETIME := ETIME + (TRUNC(ABS(STOPCLOCK - STARTCLOCK)));
      IF (ELAPSEDTIME + ETIME) >= MAXTIME
      THEN TIMEOUT := TRUE;
    END; (3)
  UNTIL (I = QSTCNT) OR (TIMEOUT);

  (* pass back # of questions answered *)
  IF TIMEOUT
  THEN QACNT := 0 (* throw away all questions if timeout occurred *)
  ELSE QACNT := I;
  PCODE := 1; (* signal that answer is valid *)
END; (* ggetsevenanswers *)

```

```
(*****
*)
*)      Textfile : ADMIN.DIR/A.ESUMM.TEXT      Volume : TFILES      *)
*)      Codefile : ADMIN.CODE ('Include' file) Volume : CATDATA      *)
*)
*****
*) File last modified : August 5, 1983      NPRDC      *)
*****
```

```
(* this procedure writes out the examinee records in a coded textfile *)
(* in which redundant text is removed. It is used by another program *)
(* which expects text to be in a certain format, this way it can do *)
(* a mass analysis of the data. *)
SEGMENT PROCEDURE ESUMMARY;
```

```
CONST (* examinee personal data file *)
      PINFONAME = 'CATDATA:EPDATA.DATA';

TYPE  (* examinee personal data record *)
      PINFOREC = RECORD
          LASTNAME : PACKED ARRAY[0..14] OF CHAR;
          FIRSTNAME : PACKED ARRAY[0..11] OF CHAR;
          INITIAL : CHAR;
          CURRADDRESS,
          HOMEOFREC : PACKED ARRAY[0..1] OF CHAR;
          CITIZENSHIP : PACKED ARRAY[0..3] OF CHAR;
          SEX : CHAR;
          POPGROUP : PACKED ARRAY[0..4] OF CHAR;
          ETHNIC : PACKED ARRAY[0..1] OF CHAR;
          MARITAL : CHAR;
          DEPENDANTS : PACKED ARRAY[0..1] OF CHAR;
          BIRTHDATE : PACKED ARRAY[0..7] OF CHAR;
          EDUCATION : PACKED ARRAY[0..2] OF CHAR;
          TESTID : PACKED ARRAY[0..2] OF CHAR;
          AFQT : PACKED ARRAY[0..1] OF CHAR;
          ASVAB : PACKED ARRAY[0..43] OF CHAR;
          ENLISTDATE,
          ACTSERDATE : PACKED ARRAY[0..7] OF CHAR;
          ENL : PACKED ARRAY[0..4] OF CHAR;
          AFEE : PACKED ARRAY[0..1] OF CHAR;
          BOS : PACKED ARRAY[0..1] OF CHAR;
          POSTASVAB : PACKED ARRAY[0..43] OF CHAR;
          STESTORDER : PACKED ARRAY[0..59] OF CHAR;
      END;
```

```
VAR TNUM,
    MAXLINES,
    DUM,
    LINESOUT,
    TESTCOUNT,
    K,
    RSLT,
    MINUTES,
    SECONDS : INTEGER;
```

```
TNAME,
ENAME,
FNAME : STRING;
```

```
SUMTIME,
SAVETIME : REAL;
```

```
(* examinee personal data *)
PINFO : PINFOREC;
PINFOFILE : FILE OF PINFOREC;
```

```
(* display examinee personal data *)
PROCEDURE SHOWEXAMINEE;
VAR J : INTEGER;

(* display some data *)
PROCEDURE D1;
BEGIN
  WITH PINFO DO
  BEGIN
    WRITELN(DEST);
    WRITE(DEST, LASTNAME, ' ');
    WRITE(DEST, FIRSTNAME, ' ');
    WRITE(DEST, INITIAL);
    WRITE(DEST, EXAMINEE.ID);
    WRITE(DEST, CURRADRESS);
    WRITE(DEST, HOME OF REC);
    WRITE(DEST, CITIZENSHIP);
    WRITE(DEST, SEX);
    WRITELN(DEST, POPGROUP);
    (* end of first line of compacted data *)
    WRITE(DEST, ETHNIC);
    WRITE(DEST, MARITAL);
    WRITE(DEST, DEPENDANTS);
    WRITE(DEST, BIRTHDATE);
  END;
END; (* d1 *)

BEGIN (* display examinee *)
  D1;
  WITH PINFO DO
  BEGIN
    WRITE(DEST, EDUCATION);
    WRITE(DEST, TESTID);
    WRITE(DEST, AFQT);
    WRITELN(DEST, ASVAB);
    (* end of second line of compact data *)
    WRITE(DEST, ENLISTDATE);
    WRITE(DEST, ACTSERDATE);
    WRITE(DEST, ENL);
    WRITELN(DEST, AFEES);
    (* end of third line of compact data *)
    WRITE(DEST, POSTASVAB);
    WRITE(DEST, BOS);
    WRITE(DEST, STESTORDER(0), STESTORDER(1));
    WRITELN(DEST, EXAMINEE.DATE);
    (* end of fourth line of compact data *)
  END;
END; (* showexaminee *)

(* check whether coding speed or numerical ops subtest
   needed to see if time info will appear at correct line
   for SPSS *)
PROCEDURE CHECKTIMEOUT;
BEGIN
  (* Test number minus one. i.e:
    5. Numerical Operations      12. Numerical Operations III
    6. Coding Speed             13. Numerical Operations IV
    10. Coding Speed II         14. Coding Speed III
    11. Numerical Operations II  15. Coding Speed IV *)
  IF EXAMINEE.TESTORDER(TINDEX) IN (5,6,10,11,12,13,14,15) THEN
  BEGIN
    IF EXAMINEE.TESTORDER(TINDEX) IN (6,10,14,15) THEN
      MAXLINES := 7 * EXAMINEE.TESTLENGTH(TINDEX)
    ELSE
      MAXLINES := 3 * EXAMINEE.TESTLENGTH(TINDEX)-1;
    IF LINESOUT < MAXLINES THEN
    BEGIN
      FOR DUM := LINESOUT+1 TO MAXLINES DO
        IF EXAMINEE.TESTORDER(TINDEX) IN (6,10,14,15)
          THEN

```

```

        IF DUM MOD 7 = 0 THEN
        BEGIN
            WRITE(DEST,'Time000 ');
            WRITELN(DEST,SAVETIME : 6 : 1);
            SAVETIME := 0.0;
        END
        ELSE
            WRITE(DEST,'Time000 ')
        ELSE
        BEGIN
            IF DUM MOD 3 = 0 THEN
            BEGIN
                WRITE(DEST,'Time000 ');
                WRITELN(DEST,SAVETIME : 6 : 1);
                SAVETIME := 0.0;
            END
            ELSE
                WRITE(DEST,'Time000 ');
            IF DUM=MAXLINES THEN
            BEGIN
                WRITELN(DEST,'          ',SAVETIME : 6 : 1);
                SAVETIME := 0.0;
            END;
        END;
    END
    ELSE
        IF NOT (EXAMINEE.TESTORDER(TINDEX) IN (6,10,14,15)) THEN
            WRITELN(DEST,'          ',SAVETIME : 6 : 1);
        END;
    END; (* checkout *)

```

```

PROCEDURE TIME;
BEGIN
    MINUTES := TESTS.STTIME DIV 60;
    SECONDS := TESTS.STTIME MOD 60;
    IF MINUTES > 0 THEN
        WRITE(DEST,MINUTES:3,':')
    ELSE
        WRITE(DEST,' :');
    IF SECONDS < 10 THEN WRITE(DEST,'0',SECONDS)
    ELSE
        WRITE(DEST,SECONDS:2);
    MINUTES := TESTS.STINSTRTIME DIV 60;
    SECONDS := TESTS.STINSTRTIME MOD 60;
    IF MINUTES > 0 THEN
        WRITE(DEST,MINUTES:3,':')
    ELSE
        WRITE(DEST,' :');
    IF SECONDS < 10 THEN WRITE(DEST,'0',SECONDS)
    ELSE
        WRITE(DEST,SECONDS:2);
    WRITE(DEST,TESTS.STPROCTCALLS:2);
    (* line 6 of compact data *)
END; (*TIME*)

```

```

(* send detailed or simple feedback to printer or screen *)
PROCEDURE OUTPUTRESULTS;
VAR J,I,K : INTEGER;
    SEVEN : PACKED ARRAY[1..7] OF CHAR;

```

```

(* get info and write header *)
PROCEDURE INFOHEADER;

```

```

    VAR SHORT_NAME : STRING;

```

```

BEGIN
    RESET(FILEDIRECTORY,INDEXNAME);
    SEEK(FILEDIRECTORY,EXAMINEE.TESTORDER(TINDEX));

```

```

GET(FILEDIRECTORY);
TNAME := FILEDIRECTORY^.TESTNAME;
CLOSE(FILEDIRECTORY,LOCK);
CURRSTRAT := EXAMINEE.STRATEGY(TINDEX);

SHORT_NAME := 'WHAT'; (* SET A DEFAULT *)
CASE EXAMINEE.TESTORDER(TINDEX) OF

```

```

0 : SHORT_NAME := 'WK';
1 : SHORT_NAME := 'GS';
2 : SHORT_NAME := 'AR';
3 : SHORT_NAME := 'MK';
4 : SHORT_NAME := 'PC';
5 : SHORT_NAME := 'NO-1';
6 : SHORT_NAME := 'CS-1';
7 : SHORT_NAME := 'AI';
8 : SHORT_NAME := 'MC';
9 : SHORT_NAME := 'EI';
10 : SHORT_NAME := 'CS-2';
11 : SHORT_NAME := 'NO-2';
12 : SHORT_NAME := 'NO-3';
13 : SHORT_NAME := 'NO-4';
14 : SHORT_NAME := 'CS-3';
15 : SHORT_NAME := 'CS-4';
16 : SHORT_NAME := 'MK-2';
17 : SHORT_NAME := 'SI';
18 : SHORT_NAME := 'MC-2';
19 : SHORT_NAME := 'AR-2';
20 : SHORT_NAME := 'EI-2';
END; (* CASE *)

```

```

Writeln(DEST,SHORT_NAME); (* end of line four of compact data *)

```

```

END; (* infoheader *)

```

```

PROCEDURE CTOUT;
BEGIN
CASE CURRSTRAT OF
NONE : Writeln(DEST,'*****');
B102222,
B54321,
B108642 : BEGIN
WRITE(DEST,TESTS.ITEMINFO(I).THETA : 2 : 3);
Writeln(DEST,TESTS.ITEMINFO(I).ERROR : 2 : 3);
END;
TIMED : BEGIN
IF TESTS.ITEMINFO(I).RTYPE <> SEVENCHR THEN
BEGIN
IF ((I+1) > QUESTIONS) OR
((I+1) > TESTS.NUMITEMS) THEN
CHECKTIMEOUT
ELSE
BEGIN
IF TESTS.ITEMINFO(I+1).ITEMNUM <= 0 THEN
CHECKTIMEOUT
ELSE
Writeln(DEST,
TESTS.ITEMINFO(I).LATENCY : 6 : 1);
END;
END;
END;
END;
END; (* ctout *)

```

```

BEGIN (* outputresults *)

```

```

INFOHEADER;
I := 0;
SUMTIME := 0.0;
LINESOUT:=0;

```

```

WHILE (I <= QUESTIONS) AND (I <= TESTS.NUMITEMS) DO
BEGIN
  IF TESTS.ITEMINFO[I].ITEMNUM > 0 THEN
  BEGIN
    IF TESTS.ITEMINFO[I].RTYPE <> SEVENCHR THEN
    BEGIN
      IF TESTS.ITEMINFO[I].ITEMNUM < 10 THEN WRITE(DEST,'000')
      ELSE
      IF TESTS.ITEMINFO[I].ITEMNUM < 100 THEN WRITE(DEST,'00')
      ELSE
      IF TESTS.ITEMINFO[I].ITEMNUM < 1000 THEN WRITE(DEST,'0');

      WRITE(DEST,TESTS.ITEMINFO[I].ITEMNUM,'*');
    END;

    SAVETIME := TESTS.ITEMINFO[I].LATENCY;
    IF CURRSTRAT = TIMED THEN
      SUMTIME := SUMTIME + SAVETIME;

    CASE TESTS.ITEMINFO[I].RTYPE OF
      CHARVALUE : BEGIN
        CASE TESTS.ITEMINFO[I].RESPONSE OF
          'A' : WRITE(DEST,'1');
          'B' : WRITE(DEST,'2');
          'C' : WRITE(DEST,'3');
          'D' : WRITE(DEST,'4');
          'E' : WRITE(DEST,'5');
        END(*CASE*);
        IF TESTS.ITEMINFO[I].CORRECT THEN
          WRITE(DEST,'1')
        ELSE
          WRITE(DEST,'0');
        END;
      INTVALUE : BEGIN
        WRITE(DEST,TESTS.ITEMINFO[I].INTRESPONSE : 1);
        IF TESTS.ITEMINFO[I].CORRECT THEN
          WRITE(DEST,'1')
        ELSE
          WRITE(DEST,'0');
        END;
      SEVENCHR : BEGIN
        J := TESTS.ITEMINFO[I].ACOUNT;
        FOR K := 1 TO J DO
        BEGIN
          IF TESTS.ITEMINFO[I].ITEMNUM < 10 THEN
            WRITE(DEST,'000')
          ELSE
          IF TESTS.ITEMINFO[I].ITEMNUM < 100 THEN
            WRITE(DEST,'00')
          ELSE
          IF TESTS.ITEMINFO[I].ITEMNUM < 1000 THEN
            WRITE(DEST,'0');
          WRITE(DEST,TESTS.ITEMINFO[I].ITEMNUM,K);
          CASE TESTS.ITEMINFO[I].CHRESPONSE[K] OF
            'A' : WRITE(DEST,'1');
            'B' : WRITE(DEST,'2');
            'C' : WRITE(DEST,'3');
            'D' : WRITE(DEST,'4');
            'E' : WRITE(DEST,'5');
          END(*CASE*);
          IF TESTS.ITEMINFO[I].ACORRECT[K-1] THEN
            WRITE(DEST,'1')
          ELSE
            WRITE(DEST,'0');
          WRITE(DEST,'*');
          LINESOUT:=LINESOUT+1;
        END; (* for *)

        TNUM := EXAMINEE.TESTORDER[I*INDEX];

        IF ((I+1) > QUESTIONS) OR
          ((I+1) > TESTS.NUMITEMS) THEN

```

```

BEGIN
  IF ((J = 7) AND (TNUM = 10)) OR
     ((J = 3) AND (TNUM = 11)) THEN
    BEGIN
      Writeln(DEST,
        TESTS.ITEMINFO[I].LATENCY:6:1);

      IF J = 7 THEN
        SAVETIME := 0.0; (* 420.0 - SUMTIME; *)
      IF J = 3 THEN
        SAVETIME := 0.0; (* 180.0 - SUMTIME; *)
    END;
    CHECKTIMEOUT;
  END
  ELSE
    BEGIN
      IF TESTS.ITEMINFO[I+1].ITEMNUM <= 0 THEN
        BEGIN
          IF ((J = 7) AND (TNUM = 10)) OR
             ((J = 3) AND (TNUM = 11)) THEN
            BEGIN
              Writeln(DEST,
                TESTS.ITEMINFO[I].LATENCY:6:1);

              IF J = 7 THEN
                SAVETIME := 0.0; (* 420.0 - SUMTIME; *)
              IF J = 3 THEN
                SAVETIME := 0.0; (* 180.0 - SUMTIME; *)
            END;
            CHECKTIMEOUT;
          END
          ELSE
            Writeln(DEST,
              TESTS.ITEMINFO[I].LATENCY:6:1);
        END;
      END;
    END;

  CTOUT;

  END;
  I := I + 1; (* each I outputs a line 5 of compact data *)
END; (* WHILE *)
TIME;

IF EXAMINEE.PREDASYAB[TINDEX] < 10.0 THEN
  BEGIN
    WRITE(DEST, ' '); (* This statement right justifies the PASVAB output *)
    Writeln(DEST, EXAMINEE.PREDASYAB[TINDEX]:5:2);
  END
  ELSE
    Writeln(DEST, EXAMINEE.PREDASYAB[TINDEX]:5:2);
    (* end of line 6 of compact data *)

END; (* outputresults *)

(* loads examinee personal data *)
PROCEDURE LOADPDATA(RECORDNUM : INTEGER);
BEGIN
  RESET(PINFOFILE, PINFOFNAME);
  SEEK(PINFOFILE, RECORDNUM);
  GET(PINFOFILE);
  PINFO := PINFOFILE^;
  CLOSE(PINFOFILE, LOCK);
END; (* load personal data *)

```

BEGIN (\* examinee summary \*)

LOADPODATA (ERECNUM);

ENAME := ' ';  
 FOR K := 0 TO 8 DO  
 ENAME[K+1] := EXAMINEE.ID[K];  
 FNAME := CONCAT('E',ENAME);  
 FNAME := CONCAT(FNAME,'.TEXT(\*)');  
 FNAME := CONCAT('QTEXT : ',FNAME);

REWRITE (DEST,FNAME);

(\* write personal data to file \*)

SHOWEXAMINEE;

RSLOT := ERECNUM \* GMAXSUBTEST;

FOR TINDEX := 1 TO GMAXSUBTEST DO

BEGIN

CURRSTRAT := EXAMINEE.STRATEGY[TINDEX];

LOADRESULTS(RSLOT);

IF TESTS.NUMITEMS > 0 THEN

BEGIN

Writeln(DEST);

OUTPUTRESULTS;

END;

RSLOT := RSLOT + 1;

END; (\* for \*)

MINUTES := EXAMINEE.TOTTIMECONSOLE DIV 60;

SECONDS := EXAMINEE.TOTTIMECONSOLE MOD 60;

WRITE(DEST,MINUTES:3,' ');

IF SECONDS < 10 THEN WRITE(DEST,'0',SECONDS)

ELSE

WRITE(DEST,SECONDS:2);

MINUTES := EXAMINEE.ORIENTATIONTIME DIV 60;

SECONDS := EXAMINEE.ORIENTATIONTIME MOD 60;

WRITE(DEST,MINUTES:3,' ');

IF SECONDS < 10 THEN WRITE(DEST,'0',SECONDS)

ELSE

WRITE(DEST,SECONDS:2);

Writeln(DEST,EXAMINEE.NUMPROC:2);

Writeln(DEST);

CLOSE(DEST,LOCK);

END; (\* endsurvey \*)

```
(*****)
(*)
(*)      Textfile : ADMIN.DIR/A.10.TEXT      Volume : TFILES      (*)
(*)      Codefile : ADMIN.CODE ('Include' file) Volume : CATDATA  (*)
(*)
(*)*****
(*)      DEC. 1, 1982      NPRDC      (*)
(*)*****
```

```
(* load the examinee directory *)
PROCEDURE LOADINDEX;
BEGIN
  RESET(EDIR,EINDEX);
  SEEK(EDIR,0);      (* examinee directory always record 0 *)
  GET(EDIR);
  DIR := EDIR^;
  CLOSE(EDIR,LOCK);
END; (* load index *)
```

```
(* get the examinee record from disc *)
PROCEDURE LOADEXAMINEE;
BEGIN
  RESET(FILEEXAMINEE,INFONAME);
  SEEK(FILEEXAMINEE,RECNUM);
  GET(FILEEXAMINEE);
  EXAMINEE := FILEEXAMINEE^;
  CLOSE(FILEEXAMINEE,LOCK);
END; (* load examinee *)
```

```
(* update examinee record *)
PROCEDURE UPDATEEXAMINEE;
BEGIN
  IF NOT DEMOFLAG THEN
  BEGIN
    RESET(FILEEXAMINEE,INFONAME);
    SEEK(FILEEXAMINEE,RECNUM);
    FILEEXAMINEE^ := EXAMINEE;
    PUT(FILEEXAMINEE);
    CLOSE(FILEEXAMINEE,LOCK);
  END;
END; (* updateexaminee *)
```

```
(* update examinee directory *)
PROCEDURE UPDATEINDEX;
BEGIN
  IF NOT DEMOFLAG THEN
  BEGIN
    RESET(EDIR,EINDEX);
    SEEK(EDIR,0);
    EDIR^ := DIR;
    PUT(EDIR);
    CLOSE(EDIR,LOCK);
  END;
END; (* update index *)
```

```
(* update test scores *)
PROCEDURE UPDATERESULTS;
BEGIN
  IF NOT DEMOFLAG THEN
  BEGIN
    RESET(FILETESTS,RESULTS);
    SEEK(FILETESTS,RECNUM);
    FILETESTS^ := TESTS;
    PUT(FILETESTS);
    CLOSE(FILETESTS,LOCK);
  END;
END; (* update results *)
```

```
(* load old test scores *)  
PROCEDURE LOADRESULTS;  
BEGIN  
  RESET(FILETESTS,RESULTS);  
  SEEK(FILETESTS,RECNUM);  
  GET(FILETESTS);  
  TESTS := FILETESTS^;  
  CLOSE(FILETESTS,LOCK);  
END; (* loadresults *)
```

```
(* load information table *)  
PROCEDURE LOADINFO;  
BEGIN  
  RESET(INFOFILE,TABNAME);  
  SEEK(INFOFILE,RECNUM);  
  GET(INFOFILE);  
  INFOTABLE := INFOFILE^;  
  CLOSE(INFOFILE,LOCK);  
END; (* load info *)
```

```
(* load the set-up parameters *)  
PROCEDURE LOADPARAMS;  
BEGIN  
  RESET(FILESPARAMS,SETUPDATA);  
  SEEK(FILESPARAMS,0);  
  GET(FILESPARAMS);  
  SPARAMS := FILESPARAMS^;  
  CLOSE(FILESPARAMS,LOCK);  
END; (* loadparams *)
```

```

(*****)
(*)
(*)      Textfile : ADMIN.DIR/A.PROCT.TEXT      Volume : TFILES      (*)
(*)      Codefile : ADMIN.CODE ('Include' file) Volume : CATDATA      (*)
(*)
(*****)
(*)      DEC. 1, 1982      NPRDC      (*)
(*****)
(*)
(*) Variable parameter passed back to indicate the state of affairs. (*)
(*)
(*) Exit codes : 1 = return to testing procedures (*)
(*)              2 = exit general instructions. (*)
(*)              3 = exit log-in / continue (*)
(*)              4 = exit subtest instructions/samples & continue (*)
(*)              5 = go on to next subtest / discontinue present (*)
(*)              6 = log-out examinee / end all modules / go on to (*)
(*)                  next examinee & session. (*)
(*)
(*****)
(*)
(*) Called from : 1 = general instructions (*)
(*)              2 = login (*)
(*)              3 = instructions/samples (*)
(*)              4 = administering question (*)
(*)              5 = driver subtest stop (*)
(*)
(*****)
(*)
(*) When ever the proctor is called, the contents of the screen is lost, (*)
(*) thus certain codes are passed around to tell if the proctor was called. (*)
(*) Then steps can be taken to restore what was on the screen before the (*)
(*) proctor call, eg. looping the writes to screen until key pressed was (*)
(*) not the help. (*)
(*)
(*****)

```

SEGMENT PROCEDURE CALLPROCTOR(CALLEDFROM : INTEGER; VAR EXITCODE : INTEGER);

CONST NUMPROCTOROPTIONS = 6;

(\* ring bell x times to call proctor \*)  
MAXBELL = 5;

(\* password 1 \*)  
P1WORD = 'LJ';

(\* password 2 \*)  
P2WORD = 'L1';

VAR SELECT,  
OPTION : CHAR;  
CONVERT : PACKED ARRAY [1..NUMPROCTOROPTIONS] OF CHAR;  
OKOPTIONS : SETOFCHAR;

X,Y,I,J,K : INTEGER;  
PFLUSH,  
PASSWORD : STRING;

DONE : BOOLEAN;

PROCEDURE INVOPTION(OPT : INTEGER; INV : BOOLEAN);  
BEGIN  
IF INV THEN  
INVERSE  
ELSE  
NORMALSCR;  
CASE OPT OF

```

1 : WRITE('RETURN TO TESTING PROCEDURES');
2 : WRITE('EXIT GENERAL INSTRUCTIONS');
3 : WRITE('EXIT LOG-IN / CONTINUE');
4 : WRITE('EXIT SUBTEST INSTRUCTIONS/SAMPLES');
5 : WRITE('GO ON TO NEXT SUBTEST');
6 : WRITE('GO ON TO NEXT SESSION');
end;

IF INV THEN
  NORMALSCR
ELSE
  INVERSE;
END;

PROCEDURE PMENU;
BEGIN
  PAGE(OUTPUT);
  GOTOXY(13,1);
  WRITE('PROCTOR MENU');
  GOTOXY(1,4);
  WRITE('Select one of the following options by');
  GOTOXY(1,5);
  WRITE('entering its number, then pressing the');
  GOTOXY(1,6);
  WRITE('<YES> key. ');

  J := 10;
  K := 1;

  (* display valid options *)
  FOR I := 1 to NUMPROCTOPTIONS DO
    BEGIN
      IF CHR(I+48) IN OKOPTIONS THEN
        BEGIN
          GOTOXY(3,J);
          CASE I OF
            1 : WRITE(K, '. RETURN TO TESTING PROCEDURES');
            2 : WRITE(K, '. EXIT GENERAL INSTRUCTIONS');
            3 : WRITE(K, '. EXIT LOG-IN / CONTINUE');
            4 : WRITE(K, '. EXIT SUBTEST INSTRUCTIONS/SAMPLES');
            5 : WRITE(K, '. GO ON TO NEXT SUBTEST');
            6 : WRITE(K, '. GO ON TO NEXT SESSION');
          end;
          J := J + 1;

          (* save association between option and menu *)
          CONVERT(K) := CHR(I+48);
          K := K + 1;
        end;
      END;
    END;

  GOTOXY(8,22);
  WRITE(' Enter choice #, then press <YES> : ');

  END; (* pmenu *)

```

```

BEGIN (* callproctor *)

  (* save total number of proctor calls *)
  EXAMINEE.NUMPROC := EXAMINEE.NUMPROC + 1;

  (* save proctor calls during this test *)
  TESTS.STPROCTCALLS := TESTS.STPROCTCALLS + 1;

  IF GRAFIX THEN
    BEGIN
      PAGE(OUTPUT);
      TEXTON;
    END;
  END;

```

```

IF NOT FORTYCOLUMN THEN
  TEXT40MODE;

IF NOT REVERSEVIDEO THEN
  INVERSE;

FOR I := 1 TO MAXBELL DO
  SQUAWK; (* notify proctor *)

(* set valid proctor menu options *)
CASE CALLEDFROM OF

  (* called from general instructions *)
  1 : OKOPTIONS := ['1','2','6'];

  (* called from login *)
  2 : OKOPTIONS := ['1','3','6'];

  (* called from subtest instructions/samples *)
  3 : OKOPTIONS := ['1','4'..'6'];

  (* called from administer question *)
  4 : OKOPTIONS := ['1','5'..'6'];

  (* called from driver stop flag *)
  5 : OKOPTIONS := ['1'];
END; (* case *)

(* tell examinee to get proctor *)
PAGE(OUTPUT);
GOTOXY(8,10);
WRITE('Please call the proctor. ');

(* get password 1 *)
REPEAT
  GOTOXY(34,10);
  if ghost then
    pflush := plword
  else
    READLN(KEYBOARD,PFLUSH);
  IF PFLUSH <> P1WORD THEN
  UNTIL PFLUSH = P1WORD;

(* get password 2 *)
PAGE(OUTPUT);
GOTOXY(8,10);
WRITE(' Password : ');

REPEAT
  GOTOXY(20,10);
  if ghost then
    password := p2word
  else
    READLN(KEYBOARD,PASSWORD);
  IF PASSWORD <> P2WORD THEN
    FOR I := 1 TO MAXBELL DO
      SQUAWK;
  UNTIL PASSWORD = P2WORD;

(*also display proctor menu also)
PMENU;

(* select an option *)
if ghost then
begin
  select := ghostdigit;
  if select > chr(k+47) then
    select := '1';
  if select = '0' then
    select := '1';
end

```

```

else
SELECT := GETCHAR(['1'..CHR(K+47)],true,TRUE,true);
OPTION := CONVERT((ORD(SELECT)-48));

Y := ORD(SELECT) - 39;
X := ORD(OPTION) - 48;

GOTOXY(6,Y);
INVOPTION(X,FALSE);

DONE := FALSE;
REPEAT

GOTOXY(8,22);
WRITE(' Enter choice #, then press <YES> : ');

(* select an option *)
if ghost then
select := chr(yeskey)
else
SELECT := GETCHAR(['1'..CHR(K+47),CHR(YESKEY)],true,TRUE,true);

IF SELECT <> CHR(YESKEY) THEN
BEGIN
GOTOXY(6,Y);
INVOPTION(X,TRUE);
OPTION := CONVERT((ORD(SELECT)-48));
Y := ORD(SELECT) - 39;
X := ORD(OPTION) - 48;
GOTOXY(6,Y);
INVOPTION(X,FALSE);
END
ELSE
DONE := TRUE;

UNTIL DONE;

(* pass back flow code *)
EXITCODE := ORD(OPTION) - 48;

(* set global flow code *)
IF EXITCODE >= 5 THEN
FLOWCODE := EXITCODE;

(* perform action based on option *)
CASE OPTION OF
'1' : ;
'2' : ;
'3' : ;
'4' : ;
'5' : ;
'6' : (* leaving session *)
(* must save point *)
(* of departure *)
BEGIN
IF QNUM = CURRTLENGTH THEN
BEGIN
(* leaving session, done with subtest *)
EXAMINEE.LASTTEST := TINDEX;

(* check if it was the last test in the series *)
IF TINDEX < GMAXSUBTEST THEN
IF SPARAMS.SUBORDER[TINDEX+1] < 8 THEN
(* if so, set done flag for examinee *)
EXAMINEE.LASTTEST := 128;
END
ELSE

(* leaving session, not done with subtest *)
EXAMINEE.LASTTEST := TINDEX - 1;

```

```
                END;  
END;  
IF NOT FORTYCOLUMN THEN  
  TEXT80MODE;  
IF NOT REVERSEVIDEO THEN  
  NORMALSCR  
ELSE  
  INVERSE;  
END; (* callproctor *)
```

```

(*)
(*)
(*)   Textfile : ADMIN.DIR/A.CF.TEXT           Volume : TFILES           *)
(*)   Codefile : ADMIN.CODE ('include' file)   Volume : CATDATA          *)
(*)
(*)
(*) File last modified : Jan 26, 1983          NPROC                      *)
(*)
(*) This procedure gives a computer familiarization session to the examinee *)
(*) by requesting that a certain key is pressed. Each key on the keypad *)
(*) is demonstrated and the examinee must press it within so many tries or *)
(*) else the proctor gets called automatically. *)

```

SEGMENT PROCEDURE COMPUTERFAMILARIZATION;

CONST MAXGIERROR = 3; (\* maximum amount of errors you can make \*)

```

VAR REVERSE,      (* holds char value to write reverse vidio *)
    ANSWER,       (* chars that examinee presses *)
    KEYCHAR : CHAR;

```

```

OK,               (* loop flags *)
DONE : BOOLEAN;

```

```

GCODE,           (* controls flow in this module *)
I,
ASCIIVALUE,
GIERROR : INTEGER; (* number of errors made *)

```

```

(* multiple chars we want examinee to type in *)
KEYSTR2 : PACKED ARRAY[0..1] OF CHAR;
KEYSTR6 : PACKED ARRAY[0..5] OF CHAR;
KEYSTR3 : PACKED ARRAY[0..2] OF CHAR;
KEYSTR9 : PACKED ARRAY[0..8] OF CHAR;

```

(\* draw the numeric keypad to screen \*)

PROCEDURE DRAWKEYBOARD;

BEGIN

```

PAGE(OUTPUT);
WRITELN('  ****  *****');
WRITELN(' |HELP|  ***  ***  ***');
WRITELN('  ****  | 7 |  | 8 |  | 9 |  ');
WRITELN('  ****  ***  ***  ***');
WRITELN('  ****  | 4 |  | 5 |  | 6 |  ');
WRITELN('  ****  ***  ***  ***');
WRITELN('  ****  | 1 |  | 2 |  | 3 |  ');
WRITELN(' keypad **> ***  ***  ***');
WRITELN(' *****');
WRITELN('  | 0 |  ');
WRITELN(' *****');
WRITELN('  ****  *****');
WRITELN('  | NO |  | YES |  ');
WRITELN('  ****  *****');
WRITELN(' *****');

```

END; (\* drawkeyboard \*)

(\* draw inverse or normal key on keypad \*)

PROCEDURE INVERSEMODE(ON : BOOLEAN; KEY : CHAR);

PROCEDURE INVWRITE(KEYSTR : STRING);

BEGIN

IF ON THEN

REVERSE := CHR(17)

ELSE

REVERSE := CHR(18);

```

WRITE(REVERSE,KEYSTR)
END; (* invwrite *)

BEGIN (* inversemode *)
  ASCIIVALUE := ORD(KEY);
  CASE ASCIIVALUE OF
    48 : BEGIN
          GOTOXY(15,11);
          INVWRITE(' 0 ');
        END;
    49 : BEGIN
          GOTOXY(14,8);
          INVWRITE(' 1 ');
        END;
    50 : BEGIN
          GOTOXY(22,8);
          INVWRITE(' 2 ');
        END;
    51 : BEGIN
          GOTOXY(30,8);
          INVWRITE(' 3 ');
        END;
    52 : BEGIN
          GOTOXY(14,5);
          INVWRITE(' 4 ');
        END;
    53 : BEGIN
          GOTOXY(22,5);
          INVWRITE(' 5 ');
        END;
    54 : BEGIN
          GOTOXY(30,5);
          INVWRITE(' 6 ');
        END;
    55 : BEGIN
          GOTOXY(14,2);
          INVWRITE(' 7 ');
        END;
    56 : BEGIN
          GOTOXY(22,2);
          INVWRITE(' 8 ');
        END;
    57 : BEGIN
          GOTOXY(30,2);
          INVWRITE(' 9 ');
        END;
    65 : BEGIN
          GOTOXY(3,3);
          INVWRITE(' A ');
          GOTOXY(16,15);
          INVWRITE('A');
        END;
    66 : BEGIN
          GOTOXY(10,3);
          INVWRITE(' B ');
          GOTOXY(16,15);
          INVWRITE('B');
        END;
    67 : BEGIN
          GOTOXY(17,3);
          INVWRITE(' C ');
          GOTOXY(16,15);
          INVWRITE('C');
        END;
    68 : BEGIN
          GOTOXY(24,3);
          INVWRITE(' D ');
          GOTOXY(16,15);
          INVWRITE('D');
        END;
    69 : BEGIN
          GOTOXY(31,3);

```

```

        INVWRITE(' E ');
        GOTOXY(16,15);
        INVWRITE('E');
    NOKEY : BEGIN
        GOTOXY(15,14);
        INVWRITE(' NO ');
    YESKEY : BEGIN
        GOTOXY(27,14);
        INVWRITE(' YES ');
    ERASEKEY : BEGIN
        GOTOXY(26,11);
        INVWRITE(' ERASE ');
    HELPKEY : BEGIN
        GOTOXY(1,1);
        INVWRITE(' HELP ');
    END;
END; (* case *)
END; (* inversemode *)

(* make examinee find 7 on keypad *)
PROCEDURE FIND7;
BEGIN
    GIERROR := 0; (* initialize count of errors *)
    OK := FALSE;

    (* loop until enters in right key *)
    WHILE (NOT OK) DO
    BEGIN
        WRITELN(' Find the ''7'' key at the upper left');
        WRITE(' and press it. ');

        (* make the key stand out *)
        INVERSEMODE(TRUE,'7');
        if ghost then
        begin
            if gierror >= maxgierror then
                keychar := '7'
            else
                keychar := ghostdigit
            end
        else
            KEYCHAR := GETCHAR([CHR(ESC),CHR(HELPKEY)]+DIGITS,TRUE,FALSE,TRUE);
            INVERSEMODE(FALSE,'7');
            DELAY(1);
            IF KEYCHAR = CHR(HELPKEY) THEN
                CALLPROCT(1,GCODE);

            IF GCODE <> 1 THEN EXIT(COMPUTERFAMILARIZATION);

            IF KEYCHAR = CHR(HELPKEY) THEN
            BEGIN
                DRAWKEYBOARD;
                WRITELN;
            END
            ELSE
            BEGIN
                BLANKLINES(17,7,17);
                IF KEYCHAR <> '7' THEN
                BEGIN
                    IF ORD(KEYCHAR) = ESC THEN
                    BEGIN
                        SKIP := TRUE;

```

```

        EXIT(COMPUTERFAMILARIZATION);
    END
    ELSE
    BEGIN
        SQUAWK;
        Writeln(' You pressed the ''',KEYCHAR,''' key instead');
        Writeln(' of the ''7'' key. Lets try it again.');
```

Writeln;

```

        GIERROR := GIERROR + 1;
        IF GIERROR = MAXGIERROR THEN
        BEGIN
            CALLPROCT(1,GCODE);
            IF GCODE <> 1 THEN
                EXIT(COMPUTERFAMILARIZATION);
            DRAWKEYBOARD;
            Writeln;
        END;
    END;
END
ELSE
BEGIN
    GOTOXY(0,19);
    OK := TRUE;
    Writeln(' Good!');
```

Writeln;

```

END;
END; (* if *)
END; (* while *)
END; (* find7 *)
```

(\* make examinee press 8 & 9 \*)

PROCEDURE FIND89;

BEGIN

GIERROR := 0;

OK := FALSE;

WHILE (NOT OK) DO

BEGIN

WRITE(' Press the 8 key and then the 9');

INVERSEMODE(TRUE,'8');

if ghost then

begin

if gierror >= maxgierror then

keychar := '8'

else

keychar := ghostdigit

end

else

KEYCHAR:=GETCHAR([CHR(HELPKEY)] + DIGITS,TRUE,FALSE,TRUE);

INVERSEMODE(FALSE,'8');

IF KEYCHAR = CHR(HELPKEY) THEN

BEGIN

CALLPROCT(1,GCODE);

IF GCODE <> 1 THEN

EXIT(COMPUTERFAMILARIZATION);

DRAWKEYBOARD;

BLANKLINES(19,4,19);

END

ELSE

BEGIN

KEYSTR2[0] := KEYCHAR;

INVERSEMODE(TRUE,'9');

if ghost then

begin

if gierror >= maxgierror then

keychar := '9'

else

keychar := ghostdigit

end

else

KEYCHAR:=GETCHAR([CHR(HELPKEY)] + DIGITS,TRUE,FALSE,TRUE);

INVERSEMODE(FALSE,'9');

```

DELAY(1);
IF KEYCHAR = CHR(HELPKEY) THEN
BEGIN
  CALLPROCT(1,GCODE);
  IF GCODE <> 1 THEN
    EXIT(COMPUTERFAMILARIZATION);
  DRAWKEYBOARD;
  BLANKLINES(19,4,19);
END
ELSE
BEGIN
  KEYSTR2[1] := KEYCHAR;
  BLANKLINES(19,4,19);
  IF KEYSTR2 = '89' THEN
    BEGIN
      WRITELN(' Good!');
      OK := TRUE;
    END
  ELSE
    BEGIN
      SQUALK;
      WRITELN(' You pressed ',KEYSTR2[0], ' and ',
        KEYSTR2[1], ' instead of 8 ');
      WRITELN(' and 9. Lets try it again. ');
      GIERROR := GIERROR + 1;
      IF GIERROR = MAXGIERROR THEN
        BEGIN
          CALLPROCT(1,GCODE);
          IF GCODE <> 1 THEN
            EXIT(COMPUTERFAMILARIZATION);
          DRAWKEYBOARD;
          BLANKLINES(19,4,19);
        END;
      END;
      WRITELN;
    END;
  END;
  (* while *)
END; (* find89 *)

(* examinee presses 1..6 *)
PROCEDURE FIND1TO6;
VAR SKIP,BADKEY : BOOLEAN;
BEGIN
  GIERROR := 0;
  OK := FALSE;
  WHILE (NOT OK) DO
    BEGIN
      WRITE(' Now type 123456 : ');
      I := 0;
      BADKEY := FALSE;
      SKIP := FALSE;
      KEYSTR6 := ' ';
      REPEAT
        if ghost then
          begin
            if gierror >= maxgierror then
              keychar := chr(ord(i+49))
            else
              keychar := ghostdigit
            end
          end
        else
          KEYCHAR:=GETCHAR((CHR(HELPKEY)) + DIGITS,TRUE,TRUE,TRUE);
          IF KEYCHAR = CHR(HELPKEY) THEN
            BEGIN
              CALLPROCT(1,GCODE);
              IF GCODE <> 1 THEN
                EXIT(COMPUTERFAMILARIZATION);
              DRAWKEYBOARD;
              BLANKLINES(19,4,21);
              SKIP := TRUE;
            END
          END
        END
      UNTIL (KEYCHAR <> CHR(HELPKEY));
      IF SKIP THEN
        BEGIN
          CALLPROCT(1,GCODE);
          IF GCODE <> 1 THEN
            EXIT(COMPUTERFAMILARIZATION);
          DRAWKEYBOARD;
          BLANKLINES(19,4,21);
          SKIP := TRUE;
        END
      END
    END
  END
  OK := TRUE;
END;

```

```

END
ELSE
BEGIN
    KEYSTR6[I] := KEYCHAR;
    IF ORD(KEYCHAR) <> (I+49) THEN
        BADKEY := TRUE;
        I := I + 1;
    END;
UNTIL (I > 5) OR (BADKEY) OR (SKIP);
IF NOT SKIP THEN
BEGIN
    BLANKLINES(19,4,19);
    IF KEYSTR6 <> '123456' THEN
        BEGIN
            SQUAWK;
            WRITELN(' You typed ',KEYSTR6,' instead of 123456');
            WRITELN(' Lets try it again. ');
            GIERROR := GIERROR + 1;
            IF GIERROR = MAXGIERROR THEN
                BEGIN
                    CALLPROCT(1,GCODE);
                    IF GCODE <> 1 THEN
                        EXIT(COMPUTERFAMILARIZATION);
                    DRAWKEYBOARD;
                    BLANKLINES(19,4,21);
                END;
            END;
        ELSE
        BEGIN
            WRITELN(' Excellent! ');
            OK := TRUE;
        END;
        WRITELN;
    END;
END; (* while *)
END; (* find1to6 *)

(* make examinee find 0 on keypad *)
PROCEDURE FIND0;
BEGIN
    GIERROR := 0;
    OK := FALSE;
    WHILE (NOT OK) DO
        BEGIN
            WRITE(' Press the 0 key. ');
            INVERSEMODE(TRUE,'0');
            if ghost then
                begin
                    if gierror >= maxgierror then
                        keychar := '0'
                    else
                        keychar := ghostdigit;
                    end
                else
                    KEYCHAR:=GETCHAR([CHR(HELPKEY)] + DIGITS,TRUE,FALSE,TRUE);
            INVERSEMODE(FALSE,'0');
            IF KEYCHAR = CHR(HELPKEY) THEN
                BEGIN
                    CALLPROCT(1,GCODE);
                    IF GCODE <> 1 THEN
                        EXIT(COMPUTERFAMILARIZATION);
                    DRAWKEYBOARD;
                    BLANKLINES(18,4,17);
                END
            ELSE
                BEGIN
                    BLANKLINES(18,4,18);
                    IF KEYCHAR <> '0' THEN
                        BEGIN
                            SQUAWK;
                            WRITELN(' You pressed the ''',KEYCHAR,'' key instead of ');

```

```

        WRITELN(' ''0'' key. Lets try it again.');
```

```

        GIERROR := GIERROR + 1;
        IF GIERROR = MAXGIERROR THEN
        BEGIN
            CALLPROC(1,GCODE);
            IF GCODE <> 1 THEN
                EXIT(COMPUTERFAMILARIZATION);
            DRAWKEYBOARD;
            BLANKLINES(18,4,17);
        END;
    END
    ELSE
    BEGIN
        WRITELN(' Good!');
        OK := TRUE;
    END;
    WRITELN;
END;
END; (* while *)
END; (* find0 *)

(* find the yes key *)
PROCEDURE FINDYES;
BEGIN
    OK := FALSE;
    GIERROR := 0;
    WHILE (NOT OK) DO
    BEGIN
        WRITELN(' Find the <YES> key at bottom right.');
```

```

        WRITELN(' Do you see it? Press <YES>');
        INVERSEMODE(TRUE,CHR(YESKEY));
        if ghost then
            keychar := chr(YESKEY)
        else
            KEYCHAR := GETCHAR([CHR(HELPKEY),CHR(YESKEY),CHR(NOKEY)]+DIGITS,
                                TRUE,FALSE,TRUE);
        INVERSEMODE(FALSE,CHR(YESKEY));
        IF KEYCHAR = CHR(HELPKEY) THEN
        BEGIN
            CALLPROC(1,GCODE);
            IF GCODE <> 1 THEN
                EXIT(COMPUTERFAMILARIZATION);
            DRAWKEYBOARD;
            BLANKLINES(18,4,18);
        END
        ELSE
        BEGIN
            BLANKLINES(18,5,19);
            IF ORD(KEYCHAR) <> YESKEY THEN
            BEGIN
                SQUANK;
                WRITELN(' Thats not correct. Please try again.');
```

```

                GIERROR := GIERROR + 1;
                IF GIERROR = MAXGIERROR THEN
                BEGIN
                    CALLPROC(1,GCODE);
                    IF GCODE <> 1 THEN
                        EXIT(COMPUTERFAMILARIZATION);
                    DRAWKEYBOARD;
                    BLANKLINES(18,4,18);
                END;
            END
            ELSE
                ok := true;
        END
    BEGIN
        INVERSEMODE(TRUE,CHR(YESKEY));
        INVERSEMODE(FALSE,CHR(NOKEY));
        GOTOXY(0,19);
        WRITELN(' Good. Use the <YES> key to answer');
        WRITELN(' ''yes'' to a question from the');
```

```

        WRITE(' computer. ');
        OK := TRUE;
        PSTALL(1,GCODE);
        INVERSEMODE(FALSE,CHR(YESKEY));
        IF ABS(GCODE) <> 1 THEN
            EXIT(COMPUTERFAMILARIZATION);
        IF GCODE = -1 THEN
            BEGIN
                DRAWKEYBOARD;
                GCODE := 1;
            END;
        END;
    *)
END;
END; (* while *)
END; (* find yes *)

(* find the no key *)
PROCEDURE FINDNO;
BEGIN
    OK := FALSE;
    GIERROR := 0;
    BLANKLINES(18,6,19);
    WHILE (NOT OK) DO
        BEGIN
            WRITELN(' Use the <NO> key at the bottom left');
            WRITELN(' to answer ''no'' to a question from');
            WRITELN(' the computer. Find the <NO> key and');
            WRITE(' press it. ');
            INVERSEMODE(TRUE,CHR(NOKEY));
            if ghost then
                keychar := chr(nokey)
            else
                KEYCHAR:=GETCHAR((CHR(HELPKEY),CHR(YESKEY),CHR(NOKEY))+DIGITS,
                                TRUE,FALSE,TRUE);
            INVERSEMODE(FALSE,CHR(NOKEY));
            IF KEYCHAR = CHR(HELPKEY) THEN
                BEGIN
                    CALLPROCT(1,GCODE);
                    IF GCODE <> 1 THEN
                        EXIT(COMPUTERFAMILARIZATION);
                    DRAWKEYBOARD;
                    BLANKLINES(18,6,18);
                END
            ELSE
                BEGIN
                    BLANKLINES(18,6,18);
                    IF ORD(KEYCHAR) <> NOKEY THEN
                        BEGIN
                            SQUAWK;
                            WRITELN(' You did not press the <NO> key');
                            GIERROR := GIERROR + 1;
                            IF GIERROR = MAXGIERROR THEN
                                BEGIN
                                    CALLPROCT(1,GCODE);
                                    IF GCODE <> 1 THEN
                                        EXIT(COMPUTERFAMILARIZATION);
                                    DRAWKEYBOARD;
                                    BLANKLINES(18,6,18);
                                END;
                            END
                        ELSE
                            BEGIN
                                OK := TRUE;
                            END;
                        END;
                    END;
                END;
            END;
        END;
    END; (* while *)
END; (* find no *)

```

```

PROCEDURE USERERASE (STR, NEW_STR : STRING);
BEGIN
  GOTOXY(0,21);
  WRITE(' TYPE ',STR[1],STR[2],STR[3]);

  GOTOXY(6,22);
  FOR I := 1 TO 3 DO
    BEGIN
      if ghost then
        keychar := str[i]
      else
        KEYCHAR := GETCHAR([STR[1]],TRUE,TRUE,TRUE);
    END;

  BLANKLINES(21,1,21);
  WRITE(' Now erase the ',STR[3],' by pressing <ERASE>');
  INVERSEMODE(TRUE,CHR(ERASEKEY));
  GOTOXY(9,22);
  if ghost then
    keychar := chr(erasekey)
  else
    KEYCHAR := GETCHAR([CHR(ERASEKEY)],TRUE,FALSE,TRUE);
  INVERSEMODE(FALSE,CHR(ERASEKEY));
  GOTOXY(8,22);
  WRITE(' ');
  BLANKLINES(21,1,18);

  WRITELN(' Good. To correct a mistake, erase it');
  WRITELN(' and type the correct key. Now replace ');
  WRITELN(' ',STR[2],' with a ',NEW_STR[1],' by pressing <ERASE> then ',
    NEW_STR[1]);
  INVERSEMODE(TRUE,CHR(ERASEKEY));
  GOTOXY(8,22);
  if ghost then
    keychar := chr(erasekey)
  else
    KEYCHAR := GETCHAR([CHR(ERASEKEY)],TRUE,FALSE,TRUE);
  INVERSEMODE(FALSE,CHR(ERASEKEY));
  GOTOXY(7,22);
  WRITE(' ');

  INVERSEMODE(TRUE,NEW_STR[1]);
  GOTOXY(7,22);
  if ghost then
    keychar := newstr[1]
  else
    KEYCHAR := GETCHAR([NEW_STR[1]],TRUE,TRUE,TRUE);
  INVERSEMODE(FALSE,NEW_STR[1]);
  BLANKLINES(18,6,21);

END;      (* Usererase *)

```

```

PROCEDURE ALPHA_BOARD;
BEGIN
  PAGE(OUTPUT);
  GOTOXY(0,2);
  WRITELN('   $$$   $$$   $$$   $$$   $$$ ');
  WRITELN(' | A | | B | | C | | D | | E | ');
  WRITELN('   $$$   $$$   $$$   $$$   $$$ ');

END;      (* ALPHA_BOARD *)

```

```

PROCEDURE ALPHA_GEN_INSTR;
BEGIN
  GOTOXY(0,8);
  WRITELN(' Just to the left of the number keys');

```

```

WRITELN(' are five keys labeled A, B, C, D, E. ');
WRITELN;
WRITELN(' You will use these keys to enter ');
WRITELN(' your answers on certain tests. ');

END;      (* ALPHA_GEN_INSTR *)

```

```

PROCEDURE ALPHA_KEY_PRESSES;
VAR CH, KEY_CH : CHAR;
BEGIN
  FOR CH := 'A' TO 'E' DO
    BEGIN
      BLANKLINES(15,1,15);
      WRITELN(' Now, find the ',CH,' key and press it! ');
      INVERSEMODE(TRUE,CH);
      if ghost then
        keychar := ch
      else
        KEYCHAR := GETCHAR([CH],TRUE,FALSE,TRUE);
      INVERSEMODE(FALSE,CH);
    END;
  PAUSE(OUTPUT);
END;      (* ALPHA_KEY_PRESSES *)

```

```

PROCEDURE ALPHA_FAMILARIZATION;
VAR
  G_ARRAY : PACKED ARRAY[0..8] OF 5..6;
BEGIN
  (* Turn Cursor Off *)
  G_ARRAY[0] := 6;
  UNITWRITE(1,G_ARRAY,1,,12);

  ALPHA_BOARD;
  ALPHA_GEN_INSTR;
  ALPHA_KEY_PRESSES;

  (* Turn Cursor On *)
  G_ARRAY[0] := 5;
  UNITWRITE(1,G_ARRAY,1,,12);
END;      (* ALPHA_FAMILARIZATION *)

```

```

(* ask if wants instructions again *)
PROCEDURE PROMPT;
BEGIN
  PAGE(OUTPUT);
  GOTOXY(8,18);
  WRITELN(' Do you want to practice using the ');
  WRITE(' computer again? ');
  if ghost then
    keychar := chr(nokey)
  else
    KEYCHAR:=GETCHAR(KEYPAD,TRUE,TRUE,TRUE);
  BLANKLINES(18,2,18);
  IF ORD(KEYCHAR) = NOKEY THEN
    BEGIN
      CALLPROC(1,GCODE);
      IF GCODE <> 1 THEN
        EXIT(COMPUTERFAMILARIZATION);
    END;
  END; (* prompt *)

```

```
(* introduce the help key *)
PROCEDURE LOHELP;
var stallchar : char;
    I,J       : integer;
BEGIN
    DRAWKEYBOARD;
    BLANKLINES(17,7,18);
    WRITELN(' Finally, find the <HELP> key at the');
    WRITELN(' top of the keyboard. ');
    WRITELN(' When you need help, press this key');
    WRITELN(' to call the proctor. ');
    WRITELN;
    WRITE(' Press the <HELP> key now. ');

    repeat
        INVERSEMODE (TRUE, CHR (HELPKEY));
        if ghost then
            stallchar := chr(helpkey)
        else
            stallchar :=
                getch([chr(helpkey), chr(YESKEY), chr(ESC)], true, true, true);
        INVERSEMODE (FALSE, CHR (HELPKEY));
        blanklines(17,7,20);
        if stallchar <> chr(helpkey) then
            write(' Try again... Press the <HELP> key. ')
        else
            begin
                write('          Very good!');
                DELAY(4);
            end;
        until stallchar = chr(helpkey);

        INVERSEMODE (FALSE, CHR (YESKEY));
        IF ABS(GCODE) <> 1 THEN
            EXIT(COMPUTERFAMILARIZATION);
        GCODE := 1;
    END; (* lohelp *)
```

```
BEGIN (* computer familiarization *)
GCODE := 1;
DONE := FALSE;
REPEAT
    DRAWKEYBOARD;
    WRITELN(' Welcome. Here are some instructions');
    WRITELN(' on how to use the test computer. ');
    WRITELN(' First, notice the numeric keypad ');
    WRITELN(' on the far right of the keyboard. ');
    WRITELN;
    FIND7;
    FIND89;
    FIND1TO6;
    FIND0;
    FINDYES;
    FINDNO;

    (*
    USERERASE('123','7');
    USERERASE('789','4');
    USERERASE('987','2');
    *)

    ALPHA_FAMILARIZATION;
    LOHELP;

    (*
    PAGE (OUTPUT);
    GOTOXY(0,13);
    WRITE(' Do you understand everything so far? ');
    if ghost then
        keychar := chr(YESKEY)
```

```
else
  KEYCHAR:=GETCHAR([CHR(NOKEY),CHR(YESKEY)],TRUE,FALSE,TRUE);
IF ORD(KEYCHAR) = NOKEY THEN
  PROMPT
ELSE
  DONE := TRUE;
*)

done := true;
UNTIL DONE;
END; (* computer familiarization *)
```

```

(*****)
(*)
(*)   Textfile : ADMIN.DIR/A.LOGIN.TEXT       Volume : TFILES      (*)
(*)   Codefile : ADMIN.CODE ('include' file)  Volume : CATDATA    (*)
(*)                                           (*)
(*****)
(*)   File Last Modified : Oct 7,1983        NPRDC              (*)
(*****)

```

```

(* get personal data and info from examinee *)
(* set up variables to handle returning or *)
(* new examinees. *)
SEGMENT PROCEDURE LOGIN;
VAR LOGTRY,
    LCODE : INTEGER; (* controls flow in this module *)

    LOGINOK,STAYOK : BOOLEAN;

```

```

(* get directory index for an id number *)
(* returns nil if no such id exists. *)
FUNCTION DIRINDEXNUM(IDNUM : IDTYPE) : INTEGER;
VAR I : INTEGER;
    DONE : BOOLEAN;
BEGIN
    LOADINDEX;
    I := 0;
    DONE := FALSE;
    DIRINDEXNUM := NIL;
    REPEAT
        IF (DIR[I].ID = IDNUM) AND
            (NOT (DIR[I].UNUSED)) THEN
            BEGIN
                DONE := TRUE;
                DIRINDEXNUM := I;
            END;
            I := I + 1;
    UNTIL (I > MAXEXAMINEE) OR (DONE);
END; (* dirindexnum *)

```

```

PROCEDURE READGTHETA;
(* read as string => integer => real *)
VAR
    REALSTR:STRING;
    NUM,DEC,DIG,I,SIZE:INTEGER;
    NEG:BOOLEAN;
BEGIN
    NEG:=FALSE;
    READLN(REALSTR);
    IF POS('-',REALSTR) > 0 THEN
        BEGIN
            DELETE(REALSTR,1,1);
            NEG:=TRUE;
        END;
    DEC:=POS('.',REALSTR);
    DELETE(REALSTR,DEC,1);
    SIZE:=LENGTH(REALSTR);
    DIG:=0;
    FOR I:=1 TO SIZE
    DO BEGIN
        NUM:=ORD(REALSTR[I]) - 48;
        DIG:=NUM +(DIG * 10);
    END;
    GTHETA:=DIG;
    DEC:=SIZE -(DEC-1);

```

```

FOR I:=1 TO DEC
DO GTHETA:=GTHETA/10;
IF NEG THEN GTHETA:= (-1 * GTHETA);
END; (* READGTHETA *)

```

PROCEDURE GHOSTMENU;

```

VAR
CHOICE: INTEGER;

```

```

BEGIN
TEXT80MODE;
INVERSE;
WRITE(CHR(28));
GOTOXY(12,4);
WRITE('GHOST OPTION MENU');
GOTOXY(8,6);
WRITE('1. RANDOM NUMBER GENERATOR GHOST');
GOTOXY(8,8);
WRITE('2. SINGLE ABILITY LEVEL SIMULATION GHOST');
GOTOXY(8,10);
WRITE('3. AUTOMATIC LOOP OF ABILITY LEVELS GHOST');
GOTOXY(8,12);
WRITE('ENTER CHOICE # :');
READLN(CHOICE);
TEXT40MODE;
GHOSTFLOW:=CHOICE;
IF GHOSTFLOW = SINGLE THEN
BEGIN
WRITE(CHR(28));
GOTOXY(1,12);
WRITE('ENTER A VALUE FOR THETA :');
READGTHETA;
END;
END; (* GHOSTMENU *)

```

(\* get examinee id number \*)

```

PROCEDURE ENTERID;
VAR OKID : BOOLEAN;
IDSTR : STRING;
K : INTEGER;

```

```

BEGIN
IDSTR := ' ';
OKID := FALSE;
REPEAT
PAGE(OUTPUT);
FILLCHAR(LINEBUF(0),9,' ');
GOTOXY(1,10);
WRITE('Press <YES> when you are done entering');
GOTOXY(1,11);
WRITE('your number. ');
GOTOXY(1,5);
WRITE('Enter your ');
GOTOXY(26,6);
WRITE('-----');
GOTOXY(1,6);
WRITE('Social Security Number : ');
(* read in 9 digit social security number *)
if ghost then
begin
IF GHOSTFLOW = AUTO
THEN
BEGIN
WRITE('GHOSTAUTO');
IF ABLOOP = MAXGTHETA
THEN ABLOOP:= MINGTHETA
ELSE
ABLOOP:= SUCC(ABLOOP);
END
ELSE IF GHOSTFLOW = SINGLE
THEN WRITE('GHOSTSING')

```

```

        ELSE
            write('GHOST');
        delay(2);
        exit(enterid);
    end
    else
        PFILLBUF(9,DIGITS + ['R','A','C','G','H','S','T','D','E','M','O','Y'],
            TRUE,2,LCODE);
    IF LCODE = 1 THEN
        BEGIN
            MOVELEFT(LINEBUF[0],EXAMINEE.ID[0],9);
            IF EXAMINEE.ID = ' ' THEN
                SQUAWK
            ELSE
                OKID := TRUE;
            END
        END
    ELSE
        BEGIN
            IF LCODE <> -1 THEN
                BEGIN
                    (* examinee leaves before log in of id # then session is invalid *)
                    FLOWCODE := 2;
                    DEMOFLAG := TRUE;
                    EXIT(LOGIN);
                END;
                LCODE := 1;
            END;
            UNTIL OKID;
            FILLCHAR(LINEBUF[0],9,' ');
            FOR K := 1 TO 9 DO
                IDSTR(K) := EXAMINEE.ID(K-1);

                (* set flag if demo *)
                IF POS('DEMO',IDSTR) <> 0 THEN
                    DEMOFLAG := TRUE
                ELSE
                    DEMOFLAG := FALSE;

                IF POS('GHOST',IDSTR) <> 0 THEN
                    BEGIN
                        GHOST := TRUE;
                        GHOSTMENU;
                        SKIPFAM := TRUE;
                    END
                ELSE
                    GHOST := FALSE;

                IF POS('TRACE',IDSTR) <> 0 THEN
                    TRACE := TRUE
                ELSE
                    TRACE := FALSE;

                IF POS('STAY',IDSTR) <> 0 THEN (* Debug routine, program remains in row *)
                    STAY := TRUE (* Uncomment routines in A.QUEST to use *)
                ELSE
                    STAY := FALSE;
            END; (* enter id *)

            (* give instructions *)
            PROCEDURE LOGINSTRUCTIONS;
            BEGIN
                (* loop until dont want instructions again *)
                REPEAT

                    (* set flow to normal *)
                    LCODE := 1;

                    (* log-in instructions *)
                    PAGE(OUTPUT);
                    GCTOXY(10,1);

```

```

WRITE('LOG-IN INSTRUCTIONS');
GOTOXY(0,3);
WRITELN(' The computer will ask you for your');
WRITELN(' Social Security Number.');
```

WRITELN;

```
WRITELN(' At that time type in your');
WRITELN(' Social Security Number and press');
WRITELN(' the <YES> key after the Social');
WRITELN(' Security Number is entered.');
```

WRITELN;

```
(* WRITELN(' If you make a mistake typing.');
```

WRITELN(' use the <ERASE> key to correct');

```
WRITELN(' the error.');
```

WRITELN;\*)

```
WRITELN(' Remember to press the <YES> key after');
WRITELN(' entering your Social Security Number.');
```

WRITELN(' Call the proctor if you have any');

```
WRITELN(' questions.');
```

WRITELN;

```
WRITE(' To continue.');
```

PSTALL(2,LCODE);

```
IF ABS(LCODE) <> 1 THEN
BEGIN
    FLOWCODE := ABS(LCODE);
    EXIT(LOGIN);
END;
```

UNTIL LCODE = 1;

```
END; (* Log instructions *)
```

BEGIN (\* log in \*)

```
LOGINSTRUCTIONS;
LOGTRY := 0;
```

REPEAT

```
    LOGINOK := TRUE;
    LCODE := 1;
    (* initialize line buffer *)
    FILLCHAR(LINEBUF(0),79,' ');

    ENTERID; (* get id number *)

    GOTOXY(13,22);
    WRITE('Please wait ');

    IF STAY THEN
    BEGIN
        STAYOK:=FALSE;
        REPEAT
            WRITE(CHR(28));
            GOTOXY(0,10);
            WRITE('ENTER THETA ROW VALUE (1 TO 36) :');
            READLN(LEVEL);
            IF (LEVEL > 36) OR (LEVEL < 1) THEN
                WRITE(CHR(7))
            ELSE
                STAYOK :=TRUE;
        UNTIL STAYOK;
    END;
```

(\* this is a demo \*)

```
IF (DEMOFLAG) or (ghost) OR (TRACE) OR (STAY) THEN
BEGIN
    DEMOFLAG := TRUE;
    ERECNUM := 0;
    TINDEX := 0;
    NEWEXAMINEE := TRUE;
    TNUM := 0;
    EXAMINEE.TESTLENGTH := SPARAMS.SUBLENGTH;
    EXIT(LOGIN);
END;
```

ERECNUM := DIRINDEXNUM(EXAMINEE.ID);

```

IF (ERECNUM >= 0) THEN (* examinee has been entered into system *)
BEGIN
  LOADEXAMINEE(ERECNUM);

  IF (EXAMINEE.LASTTEST < GMAXSUBTEST) and (not ghost) THEN
  BEGIN
    NEWEXAMINEE := FALSE;

    (* setup examinee to resume old test *)

    (* set index into configuration array where last left off *)
    TINDEX := EXAMINEE.LASTTEST;

    (* set next place to store results record *)
    TNUM := ERECNUM * GMAXSUBTEST + TINDEX;

    (* load in previous results of unfinished test *)
    LOADRESULTS(TNUM);

  END
  ELSE
  IF (EXAMINEE.LASTTEST = GMAXSUBTEST) THEN
  BEGIN
    NEWEXAMINEE := TRUE;
    (* save the examinee's configuration *)
    WITH EXAMINEE DO
    BEGIN
      TESTORDER := SPARAMS.SUBORDER;
      SUBSTOP := SPARAMS.SUBSTOP;
      CKERROR := SPARAMS.CKERROR;
      TESTLENGTH := SPARAMS.SUBLENGTH;
      STRATEGY := SPARAMS.SUBSTRAT;
      DATE := SYSTEMDATE;
    END;

    (* set the logical record number to store results on disk *)
    TNUM := ERECNUM * GMAXSUBTEST;

    (* set the index into configuration arrays *)
    TINDEX := 0;

    (* update examinee record on disk *)
    UPDATEEXAMINEE(ERECNUM);

    (* update examinee directory *)
    UPDATEINDEX;
  END
  ELSE
  BEGIN
    FLOWCODE := 6; (* examinee done, dont give session *)
    DEMOFLAG := TRUE;
    GOTOXY(13,22);
    WRITE(' ');
    GOTOXY(0,13);
    WRITELN;
    WRITELN;
    WRITELN(' This examinee done with session already. ');
    WRITELN;
    WRITELN;
    SQUAWK;
    STALL;
  END;
END
ELSE
BEGIN
  GOTOXY(13,22);
  WRITE(' ');
  GOTOXY(0,13);
  WRITELN;
  WRITELN;
  WRITELN(' Access for ',EXAMINEE.ID,' not verified. ');
  WRITELN;

```

```
WRITELN;  
SQUAWK;  
STALL;  
LOGINOK := FALSE;  
LOGTRY := LOGTRY + 1;  
LCODE := 1;  
IF LOGTRY > 3 THEN  
    CALLPROCTOR(2,LCODE);  
IF LCODE >= 3 THEN  
    BEGIN  
        IF LCODE = 3 THEN  
            FLOWCODE := 6;  
            EXIT(LOGIN);  
        END;  
    END;UNTIL LOGINOK;  
END; (* log-in *)
```

```
(*****)
(*)
(*)      Textfile : ADMIN.DIR/A.GI.TEXT          Volume : TFILES          (*)
(*)      Codefile : ADMIN.CODE ('include' file) Volume : CATDATA          (*)
(*)
(*)
(*)
(*)
(*)      File last modified : Jun 15, 1983          NPRODC          (*)
(*****)
```

```
(* give test taking information *)
SEGMENT PROCEDURE GENERALINSTRUCTIONS;
VAR ANSWER,
    KEYCHAR : CHAR;
    GCODE : INTEGER;
    DONE : BOOLEAN;
```

```
(* ask if wants instructions again *)
PROCEDURE PROMPT;
BEGIN
    PAGE(OUTPUT);
    GOTOXY(0,10);
    WRITELN(' Do you want to go through the');
    WRITE(' instructions again? ');
    if ghost then
        keychar := chr(nokey)
    else
        KEYCHAR:=GETCHAR(KEYPAD,TRUE,TRUE,TRUE);
    BLANKLINES(18,2,18);
    IF ORD(KEYCHAR) = NOKEY THEN
        BEGIN
            CALLPROC(1,GCODE);
            IF GCODE <> 1 THEN
                EXIT(GENERALINSTRUCTIONS);
        END;
    END;
END; (* prompt *)
```

```
(* test taking info *)
PROCEDURE TINFO1;
BEGIN
    PAGE(OUTPUT);
    GOTOXY(9,1);
    WRITELN(' HOW TO TAKE THE TESTS');
    WRITELN;
    WRITELN(' Most of the questions on the tests are');
    WRITELN(' multiple choice, that is... there will');
    WRITELN(' be a question followed by a list of ');
    WRITELN(' choices. For example....');
    WRITELN;
    WRITE(' How many eggs are there in a dozen?');
    GOTOXY(15,11);
    WRITE(' A. 10');
    GOTOXY(15,13);
    WRITE(' B. 16');
    GOTOXY(15,15);
    WRITE(' C. 12');
    GOTOXY(15,17);
    WRITE(' D. 24');
    GOTOXY(0,19);
    REPEAT
        WRITE(' Your answer : ');
        if ghost then
            answer := 'C'
        else
            ANSWER:=GETCHAR(['A'..'D'],TRUE,TRUE,TRUE);
        WRITELN;
        WRITELN;
        WRITE(' Is ',ANSWER,' the answer you want to give? ');
        if ghost then
            keychar := chr(yeskey)
        else
```

```

KEYCHAR:=GETCHAR([CHR(YESKEY),CHR(NOKEY)],TRUE,FALSE,TRUE);
IF ORD(KEYCHAR) = NOKEY THEN
  BLANKLINES(19,3,19);
UNTIL ORD(KEYCHAR) = YESKEY;
BLANKLINES(21,1,21);
IF ANSWER = 'C' THEN
  WRITELN(' Thats right.')
ELSE
  WRITELN(' The correct answer is C.');
```

```

(* more test taking info *)
PROCEDURE TINFO2;
BEGIN
  PAGE(OUTPUT);
  WRITELN;
  WRITELN(' Here is another example.....');
  WRITELN;
  WRITELN;
  WRITELN;
  WRITELN;
  WRITELN;
  WRITE(' What is two plus two?');
  GOTOXY(15,10);
  WRITE(' A. Eight');
  GOTOXY(15,12);
  WRITE(' B. Four');
  GOTOXY(15,14);
  WRITE(' C. Eleven');
  GOTOXY(15,16);
  WRITE(' D. Twenty');
  GOTOXY(0,21);
  REPEAT
    WRITE(' Your answer : ');
    if ghost then
      answer := 'A'
    else
      ANSWER:=GETCHAR(['A'..'D'],TRUE,TRUE,TRUE);
    WRITELN;
    WRITELN;
    WRITE(' Is ''',ANSWER,''' the answer you want to give? ');
    if ghost then
      keychar := chr(YESKEY)
    else
      KEYCHAR := GETCHAR([CHR(YESKEY),CHR(NOKEY)],TRUE,FALSE,TRUE);
    IF ORD(KEYCHAR) = NOKEY THEN
      BLANKLINES(21,3,21);
    UNTIL ORD(KEYCHAR) = YESKEY;
    BLANKLINES(21,3,21);
    IF ANSWER = 'B' THEN
      WRITELN(' Thats right.')
    ELSE
      WRITELN(' The correct answer is B.');
```

```

  WRITELN;
  PSTALL(1,GCODE);
  IF ABS(GCODE) <> 1 THEN
    EXIT(GENERALINSTRUCTIONS);
  GCODE := 1;
END; (* tinfo2 *)

BEGIN (* general instructions *)
  GCODE := 1;
  DONE := FALSE;
  REPEAT
    TINFO1;
```

```

TINFO2;
PAGE(OUTPUT);
GOTOXY(0,13);
WRITE(' Do you understand everything so far? ');
if ghost then
  keychar := chr(yeskey)
else
  KEYCHAR:=GETCHAR([CHR(INOKEY),CHR(YESKEY)],TRUE,FALSE,TRUE);
IF ORD(KEYCHAR) = NOKEY THEN
  PROMPT
ELSE
  DONE := TRUE;
IF DONE THEN
BEGIN
  PAGE(OUTPUT);
  GOTOXY(0,9);
  WRITELN(' This is the end of your computer');
  WRITELN(' introduction. If you still are not');
  WRITELN(' comfortable with the keyboard or the');
  WRITELN(' instructions, please see the proctor');
  WRITELN(' for assistance. Thank you.');
```

WRITELN;

```

  WRITE(' To continue,');
  PSTALL(1,GCODE);
  IF ABS(GCODE) <> 1 THEN
    EXIT(GENERALINSTRUCTIONS);
  GCODE := 1;
  PAGE(OUTPUT);
  GOTOXY(0,6);
  WRITELN(' You should have scratch paper and a');
  WRITELN(' pencil for any figuring you need to');
  WRITELN(' do. Return the scratch paper when');
  WRITELN(' you finish the test.');
```

WRITELN;

```

  WRITELN(' If another pencil or more paper is');
  WRITELN(' needed during the test, use the');
  WRITELN(' <HELP> key to call the proctor.');
```

WRITELN;

```

  PSTALL(1,GCODE);
  IF ABS(GCODE) <> 1 THEN
    EXIT(GENERALINSTRUCTIONS);
END;
UNTIL DONE;
END; (* general instructions *)
```

```
(*****)
(*)
(*)      Textfile : ADMIN.DIR/A.INITE.TEXT      Volume : TFILES      (*)
(*)      Codefile : ADMIN.CODE ('Include' file) Volume : CATDATA    (*)
(*)
(*)
(*)
(*)      DEC. 1, 1982      NPRDC      (*)
(*)
(*****)
```

```
(* This procedure initializes the examinees test result record and *)
(* takes into account if he is a new examinee or a returning      *)
(* examinee.                                                         *)
```

```
SEGMENT PROCEDURE INITEXAMINEE;
BEGIN
```

```
(* initialize pool of previously used questions *)
FOR QNUM := 0 TO QUESTIONS DO
  USEDQ(QNUM) := NIL;
```

```
(* turn prefetching off for the first question either for returning to a *)
(* subtest or starting a the beginning of a new subtest.                  *)
FIRSTQUESTION := TRUE;
```

```
SAMPLEQUESTION := FALSE;
```

```
(* set flag for timed tests, time not expired yet *)
TIMEOUT := FALSE;
```

```
(* new examinee is first time they've logged in *)
IF NEWEXAMINEE THEN
  BEGIN
```

```
    INITSCORES := TRUE;
```

```
(* set all parameters to today's set up *)
CURRSTRAT := SPARAMS.SUBSTRAT(TINDEX);
CURRTLENGTH := SPARAMS.SUBLENGTH(TINDEX);
CURRSUBSTOP := SPARAMS.SUBSTOP(TINDEX);
CURRTEST := SPARAMS.SUBORDER(TINDEX);
```

```
  END
```

```
  ELSE
```

```
  BEGIN (* examinee previously logged in, returning to complete tests *)
```

```
    (* reset pool of used questions that examinee has taken already *)
```

```
    IF NOT INITSCORES THEN
```

```
      BEGIN
```

```
        QNUM := -1;
```

```
        REPEAT
```

```
          QNUM := QNUM + 1;
```

```
          USEDQ(QNUM) := TESTS.ITEMINFO(QNUM).ITEMNUM;
```

```
        UNTIL (USEDQ(QNUM) < 0) OR (QNUM >= QUESTIONS);
```

```
      END;
```

```
(* reset examinee's last ability and variance *)
```

```
CURRABILITY := TESTS.ESTABILITY;
```

```
CURRVARIANCE := TESTS.VARIANCE;
```

```
(* reset elapsed time if timed subtest *)
```

```
ELAPSEDTIME := EXAMINEE.PREVTIMELASTTEST;
```

```
(* reset all parameters set up for this examinee *)
```

```
CURRSTRAT := EXAMINEE.STRATEGY(TINDEX);
```

```
CURRTLENGTH := EXAMINEE.TESTLENGTH(TINDEX);
```

```
CURRSUBSTOP := EXAMINEE.SUBSTOP(TINDEX);
```

```
CURRTEST := EXAMINEE.TESTORDER(TINDEX);
```

```
(* if test item count is zero, examinee is returning to the *)
```

```
(* beginning of a subtest and must initialize the test score *)
```

```
IF TESTS.NUMITEMS <= 0 THEN
```

```
  INITSCORES := TRUE;
```

```
END;

(* if examinee returns to middle of subtest, don't initialize *)
(* his test results record. *)
IF INITScores THEN
BEGIN
  CURRABILITY := 0; (* initialize examinee ability *)

  (* initialize examinee variance *)
  CURRVARIANCE := 1.0;

  (* initialize stopwatch for timed tests *)
  ELAPSEDTIME := 0;

  (* initialize #items taken, #correct *)
  TESTS.NUMCORR := 0;
  TESTS.NUMITEMS := 0;
  TESTS.STPROCTCALLS := 0;

  (* mark all item codes nil <unused> *)
  FOR QNUM := 0 TO QUESTIONS DO
    TESTS.ITEMINFO(QNUM).ITEMNUM := NIL;

  (* initialize array index for current question *)
  QNUM := 0;
END;
END; (* initexaminee *)
```

```

*****
(*)
(*)      Textfile : ADMIN.DIR/A.LOADT.TEXT          Volume : TFILES
(*)      Codefile  : ADMIN.CODE ('Include' file)    Volume : CATDATA
(*)
*****
(*) File last modified : OCT 18, 1983                NPRDC
*****

```

```
(* loads directory of test , loads appropriate data structure for *)
(* strategy if any, gives instructions and samples for subtest.    *)
```

SEGMENT PROCEDURE LOADTEST:

```
CONST MAXSQERROR = 3; (* maximum # errors in samples before calling proctor *)
```

```

VAR QCOUNT,      (* # of questions on multiple question screen *)
    HASHLOC,      (* record # of data, block/byte ptrs *)
    BLOCK,        (* which block text starts *)
    BLOCKPTR,     (* which byte in block text starts *)
    SCODE,        (* flow control in this module *)
    SECS,         (* seconds for timed tests *)
    SQERROR : INTEGER; (* # of key errors in sample questions *)
    TIMECODE,
    TEXTCODE,     (* specifies screen format *)
    RCHAR : CHAR;

```

(\* answer the sample questions \*)

PROCEDURE ANSWERSAMPLE:

VAR CHRANS : CHAR;

QACOUNT.

INTANS : INTEGER;

S7ANS : SEVENTYPE;

OK : BOOLEAN;

**BEGIN**

(\* answer type \*)

CASE ITEMINFO.ATYPE OF

(\* multiple choice \*)

CHARVALUE : BEGIN

(\* get answer \*)

```
CHTRANS := GETCHTRANSER(3,SCODE);
```

(\* scode <> 1, proctor was called \*)

```
IF SCODE <> 1 THEN
```

```
EXIT(ANSWERSAMPLE);
```

(\* sample feedback \*)

```
IF CHRANS = ITEMINFO.ANSWER THEN
```

**BEGIN**

BLANK LINES (23,1,23):

```
WRITE('That's correct! ');
```

**STALL:**

END

ELSE

**BEGIN**

(\* count # of wrong key ins \*)

```
SOERROR := 0;
```

**REPEAT**

BLANK LINES (21,3,21);

```
WRITELN('The correct answer is ',
```

ITEMINFO.ANSWER, ' not ',CHRANS);

WRITELN;

```
WRITE('Type ',ITEMINFO.ANSWER,
```

' on your keypad : ' );

if ghost then

```

        chrans := iteminfo.answer
    else
        CHRANS :=
            GETCHAR([ITEMINFO.LOWANSWER..ITEMINFO.HIGHANSWER],
                TRUE,TRUE,TRUE);
        IF CHRANS <> ITEMINFO.ANSWER THEN
            BEGIN
                SQERROR := SQERROR + 1;
                IF SQERROR = MAXSQERROR THEN
                    BEGIN

                        (* call proctor if refuses to press right key *)
                        CALLPROCT(3,SCODE);
                        IF SCODE <> 1 THEN
                            EXIT(ANSWERSAMPLE);

                        (* restore cscreen to what it was *)
                        DECODEPRINT(BLOCK,BLOCKPTR);
                    END;
                END;
            UNTIL (CHRANS = ITEMINFO.ANSWER);
        END;
    END;

(* integer value as answer *)
INTVALUE : BEGIN

    (* get an integer *)
    INTANS := GETINTANSWER(3,SCODE);
    IF SCODE <> 1 THEN
        EXIT(ANSWERSAMPLE);
    IF INTANS = ITEMINFO.INTANSWER THEN
        BEGIN
            BLANKLINES(23,1,23);
            WRITE('Thats correct! ');
            STALL;
        END
    ELSE
        BEGIN
            SQERROR := 0;
            REPEAT
                BLANKLINES(21,3,21);
                WRITELN('The correct answer is ',
                    ITEMINFO.INTANSWER, ' not ',
                    INTANS);
                WRITELN;
                WRITE('Enter the correct answer : ');
                if ghost then
                    intans := iteminfo.intanswer
                else
                    INTANS := GETINTSTR;
                IF INTANS <> ITEMINFO.INTANSWER THEN
                    BEGIN
                        SQERROR := SQERROR + 1;
                        IF SQERROR = MAXSQERROR THEN
                            BEGIN
                                CALLPROCT(3,SCODE);
                                IF SCODE <> 1 THEN
                                    EXIT(ANSWERSAMPLE);
                                DECODEPRINT(BLOCK,BLOCKPTR);
                            END;
                        END;
                    UNTIL INTANS = ITEMINFO.INTANSWER;
                END;
            END;

(* get an array of 7 chars *)
SEVENCHR : BEGIN
    QCOUNT := ITEMINFO.ANSWERCOUNT;
    GETSEVENANSWERS(1,QCOUNT,3,BLOCK,BLOCKPTR,S7ANS,SCODE,
        QACOUNT);
    IF SCODE <> 1 THEN
        EXIT(ANSWERSAMPLE);

```

```

        BLANKLINES(21,3,20);
        WRITE('Your answers were : ');
        FOR I := 1 TO QCOUNT DO
            WRITE(' ',I,' ') S7ANS[I], ' ');
        WRITELN;
        WRITE('Correct answers are : ');
        FOR I := 1 TO QCOUNT DO
            WRITE(' ',I,' ') ITEMINFO.CHANSWER[I], ' ');
        WRITELN;
        WRITELN;
        STALL;
    END;

```

```

    END; (* case *)
    SCODE := 1;
END; (* answer samples *)

```

(\* answer the sample questions grafix version \*)

PROCEDURE GANSWERSAMPLE;

VAR CHRANS : CHAR;

QACOUNT,

W,

INTANS : INTEGER;

S7ANS : SEVENTYPE;

OK : BOOLEAN;

BEGIN

(\* answer type \*)

CASE ITEMINFO.ATYPE OF

(\* multiple choice \*)

CHARVALUE : BEGIN

(\* get answer \*)

CHRANS := GGETCHRANSWER(3,SCODE);

(\* scode <> 1, proctor was called \*)

IF SCODE <> 1 THEN

EXIT(GANSWERSAMPLE);

(\* sample feedback \*)

IF CHRANS = ITEMINFO.ANSWER THEN

BEGIN

GBLANKLINES(23,1,23);

GWRITESTR('Thats correct! ');

GSTALL;

END

ELSE

BEGIN

(\* count # of wrong key ins \*)

SCERROR := 0;

REPEAT

GBLANKLINES(21,3,21);

GWRITESTR('The correct answer is ');

GWRITECHR(ITEMINFO.ANSWER);

GWRITESTR(' not ');

GWRITECHR(CHRANS);

GWRITELN;

GWRITELN;

GWRITESTR('Type ');

GWRITECHR(ITEMINFO.ANSWER);

GWRITESTR(' on your keypad : ');

if ghost then

chrans := iteminfo.answer

else

CHRANS :=

GGETCHAR([ITEMINFO.LOWANSWER..ITEMINFO.HIGHANSWER],

TRUE,TRUE,TRUE);

IF CHRANS <> ITEMINFO.ANSWER THEN

BEGIN

SCERROR := SCERROR + 1;

```

        IF SQERROR = MAXSQERROR THEN
        BEGIN
            (* call proctor if refuses to press right key *)
            CALLPROCT(3,SCODE);
            IF SCODE <> 1 THEN
                EXIT(ANSWERSAMPLES);

            (* restore cscreen to what it was *)
            GDECODEPRINT(CURRTEST,1);
        END;
    END;
    UNTIL (CHRANS = ITEMINFO.ANSWER);
    END;
    END;

(* integer value as answer *)
INTVALUE : BEGIN
    (* get an integer *)
    INTANS := GGETINTANSWER(3,SCODE);
    IF SCODE <> 1 THEN
        EXIT(GANSWERSAMPLE);
    IF INTANS = ITEMINFO.INTANSWER THEN
    BEGIN
        GBLANKLINES(23,1,23);
        GWRITESTR('Thats correct! ');
        GSTALL;
    END
    ELSE
    BEGIN
        SQERROR := 0;
        REPEAT
            GBLANKLINES(21,3,21);
            GWRITESTR('The correct answer is ');
            GWRITEINT(ITEMINFO.INTANSWER);
            GWRITESTR(' not ');
            GWRITEINT(INTANS);
            GWRITELN;
            GWRITELN;
            GWRITESTR('Enter the correct answer : ');
            if ghost then
                intans := iteminfo.intanswer
            else
                INTANS := GGETINTSTR;
            IF INTANS <> ITEMINFO.INTANSWER THEN
            BEGIN
                SQERROR := SQERROR + 1;
                IF SQERROR = MAXSQERROR THEN
                BEGIN
                    CALLPROCT(3,SCODE);
                    IF SCODE <> 1 THEN
                        EXIT(ANSWERSAMPLE);
                    GDECODEPRINT(CURRTEST,1);
                END;
            END;
            UNTIL INTANS = ITEMINFO.INTANSWER;
        END;
    END;

(* get an array of 7 chars *)
SEVENCHR : BEGIN
    QCOUNT := ITEMINFO.ANSWERCOUNT;
    GGETSEVENANSWERS(1,QCOUNT,3,CURRTEST,1,S7ANS,SCODE,
        QACOUNT);
    IF SCODE <> 1 THEN
        EXIT(GANSWERSAMPLE);
    GBLANKLINES(21,3,20);
    GWRITESTR('Your answers were : ');
    FOR W := 1 TO QCOUNT DO
    BEGIN
        GWRITECHR(' ');
        GWRITEINT(W);
    
```

```

        GWRITESTR(' ');
        GWRITECHR(S7ANS(W));
        GWRITESTR(' ');
    END;
    GWRITELN;
    GWRITESTR('Correct answers are : ');
    FOR W := 1 TO QCOUNT DO
    BEGIN
        GWRITECHR(' ');
        GWRITEINT(W);
        GWRITESTR(' ');
        GWRITECHR(ITEMINFO.CHANSWER(W));
        GWRITESTR(' ');
    END;
    GWRITELN;
    GWRITELN;
    GSTALL;
END;

```

```

    END; (* case *)
    SCORE := 1;
END; (* answer samples *)

```

BEGIN (\* loadtest \*)

```

RESET(FILEDIRECTORY,INDEXNAME);
SEEK(FILEDIRECTORY,CURRTEST);
GET(FILEDIRECTORY);

```

```

(* load question index *)
DIRECTORY := FILEDIRECTORY^;
CLOSE(FILEDIRECTORY,LOCK);

```

```

(* configure questions according to strategy *)
CASE CURRSTRAT OF
    NONE      : ;
    TIMED     : BEGIN
        (* get maximum time allowed in seconds *)
        TIMECODE := DIRECTORY.TESTNAME(2);
        MAXTIME := (ORD(TIMECODE) - 48) * 60;
        TIMECODE := DIRECTORY.TESTNAME(3);
        MAXTIME := MAXTIME + ((ORD(TIMECODE) - 48) * 10);
        TIMECODE := DIRECTORY.TESTNAME(4);
        MAXTIME := MAXTIME + (ORD(TIMECODE) - 48);
    END;

```

```

(* load information table *)
B102222,
B54321,
B108642 : LOADINFO(CURRTEST + MAXSUBTESTS + 1);
END;

```

```

(* set default screen format 40 columns inverse *)
REVERSEVIDEO := TRUE;
FORTYCOLUMN := TRUE;

```

```

(* check if any other type format desired *)
TEXTCODE := DIRECTORY.TESTNAME(1);
CASE TEXTCODE OF
    '*' : FORTYCOLUMN := FALSE;
    'e' : BEGIN
        FORTYCOLUMN := FALSE;
        REVERSEVIDEO := FALSE;
    END;

```

```

'?' : REVERSEVIDEO := FALSE;
END;

IF FORTYCOLUMN THEN
  TEXT40MODE
ELSE
  TEXT80MODE;

IF REVERSEVIDEO THEN
  INVERSE
ELSE
  NORMALSCR;

(* loop instructions and samples until examinee comfortable *)
REPEAT

  (* loop instructions *)
  REPEAT

    (* set flow to normal *)
    SCODE := 1;

    (* display subtest instructions *)
    IF DIRECTORY.ITEMCODE(0) >= 0 THEN
      BEGIN

        (* get record # to load ptrs to get text *)
        HASH_LOC := HASH(0);
        RESET(FILEITEMINFO,DATANAME);
        SEEK(FILEITEMINFO,HASH_LOC);
        GET(FILEITEMINFO);
        ITEMINFO := FILEITEMINFO^;
        CLOSE(FILEITEMINFO,LOCK);

        (* load ptrs for text *)
        BLOCK := ITEMINFO.ITEMBLOCK;
        BLOCKPTR := ITEMINFO.ITEMPTR;

        (* display the text *)
        DECODEPRINT(BLOCK,BLOCKPTR);

        (* allow examinee to call proctor if wants *)
        GOTOXY(0,21);
        PSTALL(3,SCODE);
        IF ABS(SCODE) > 4 THEN
          (* does not want to continue subtest or session *)
          EXIT(LOADTEST);
        END;
      UNTIL (SCODE = 1)      (* normal *)
        OR (SCODE = -4);    (* exit instructions *)

      (* reset back to normal *)
      SCODE := 1;

      (* give subtest samples *)
      SAMPLEQUESTION := TRUE;
      I := 1;
      WHILE (I <= 5) DO
        BEGIN
          IF DIRECTORY.ITEMCODE(I) > 0 THEN
            BEGIN

              (* get record # of data for this sample *)
              HASH_LOC := HASH(I);
              RESET(FILEITEMINFO,DATANAME);
              SEEK(FILEITEMINFO,HASH_LOC);
              GET(FILEITEMINFO);
              ITEMINFO := FILEITEMINFO^;
              CLOSE(FILEITEMINFO,LOCK);

              (* get text pointers for sample *)
              BLOCK := ITEMINFO.ITEMBLOCK;
              BLOCKPTR := ITEMINFO.ITEMPTR;

```

```

(* give the sample until examinee answers or skips *)
REPEAT

    (* reset normal flow *)
    SCORE := 1;

    (* display the sample *)
    IF ITEMINFO.GRAPHICS THEN
    BEGIN
        GRAFIX := TRUE;
        GOECODEPRINT(CURRTEST,1);
        PAGE(OUTPUT);
        GANSWERSAMPLE;
        GRAFIX := FALSE;
        TEXTON;
    END
    ELSE
    BEGIN
        DECODEPRINT(BLOCK,BLOCKPTR);
        ANSWERSAMPLE;
    END;

    IF ABS(SCORE) > 4 THEN
        (* wants to leave subtest or session *)
        EXIT(LOADTEST);

    IF ABS(SCORE) = 4 THEN
        (* wants to exit rest of samples *)
        BEGIN
            SCORE := 1;
            I := 5;
        END;
        UNTIL SCORE = 1;
    END;
    I := I + 1;
END;

(* ask if ready to begin test *)
PAGE(OUTPUT);
IF FORTYCOLUMN THEN
    GOTOXY(1,10)
ELSE
    GOTOXY(21,10);
WRITE('Are you ready to begin the test? ');
if ghost then
    rchar := chr(yeskey)
else
    RCHAR := GETCHAR([CHR(YESKEY),CHR(NOKEY)],TRUE,FALSE,TRUE);
IF RCHAR = CHR(NOKEY) THEN
    BEGIN
        PAGE(OUTPUT);
        IF FORTYCOLUMN THEN
            GOTOXY(1,10)
        ELSE
            GOTOXY(21,10);
        WRITELN('Do you want to go over the instructions');

        IF NOT FORTYCOLUMN THEN
            GOTOXY(21,11);
        WRITE(' and samples again? ');
        IF GETCHAR([CHR(YESKEY),CHR(NOKEY)],TRUE,FALSE,TRUE) = CHR(NOKEY) THEN
            (* call proctor if not ready and doesnt want more instructions *)
            CALLPROCT(3,SCORE);
        IF SCORE <> 1 THEN
            EXIT(LOADTEST);
        END;
        UNTIL (RCHAR = CHR(YESKEY));
        SAMPLEQUESTION := FALSE;
    END; (* loadtest *)

```

```
(*****)
(*)
(*)      Textfile : ADMIN.DIR/A.QUEST.TEXT      Volume : TFILES      (*)
(*)      Codefile : ADMIN.CODE ('Include' file) Volume : CATDATA      (*)
(*)
(*)
(*)      File last modified : Aug 5, 1983      NPROC      (*)
(*****)
```

```
(* This procedure searches through an appropriate strategy data structure *)
(* and selects a question to give the examinee based on certain data. It *)
(* also checks to see if the question has been used before and gives one *)
(* which hasn't been used. It elicits an answer from the examinee and *)
(* updates the record with his response. *)
```

```
PROCEDURE ADMINISTERQUESTION;
VAR QCOUNT,      (* # of questions per item in special tests *)
    OSTCODE,      (* code # of question *)
    OSLOT,        (* slot in directory *)
    BLK,          (* block where text starts *)
    BLKPTR,      (* byte in block where text starts *)
    I,
    INTANS,      (* integer answer to question *)
    DATASLOT,    (* record # where text ptrs are and data *)
    ACODE : INTEGER; (* flow variable for this module *)

    CHRANS : CHAR; (* multiple choice answer *)

    S7ANS : SEVENTYPE; (* seven char answer *)
    GATE,
    DONE : BOOLEAN;

    START,      (* time question appeared *)
    STOP : REAL; (* time examinee answered question *)

    (* this function searches an array of used question *)
    (* codes and returns nil if the question was unused *)
    FUNCTION SEARCH(QCODE : INTEGER) : INTEGER;
    VAR FOUND : BOOLEAN;
        I : INTEGER;
    BEGIN
        IF QCODE < 0 THEN (* invalid code #, set that it was used so wont use *)
            SEARCH := 1000 (* any positive number will do *)
        ELSE
            BEGIN
                FOUND := FALSE;
                I := 0;
                REPEAT
                    IF USEDQ[I] = QCODE THEN
                        FOUND := TRUE
                    ELSE
                        I := I + 1;
                UNTIL (FOUND) OR (I > QNUM) OR (I > QUESTIONS);
                IF FOUND THEN
                    SEARCH := I
                ELSE
                    SEARCH := NIL;
            END;
        END; (* search *)
    END;

    PROCEDURE ERROR(IROW:INTEGER);
    VAR PASSWORD,PWORD:STRING;
        I:INTEGER;
    BEGIN
        PAGE(OUTPUT);
        WRITELN('INFOTABLE SELECT ERROR !!!!!');
        WRITELN;
        WRITELN('NO MORE QUESTIONS AT THIS ABILITY LEVEL');
        WRITELN;
        WRITELN('INFOTABLE ROW ',IROW);
```

```

WRITELN;
STALL;
(*
WRITELN(SAVERC(1), ' ', SAVERC(2));
WRITELN(SAVERC(3), ' ', SAVERC(4));
*)
FOR I:=1 TO 5 DO
BEGIN
  WRITE(I, ' ', INFOTABLE[I, IROW], ' ');
  WRITE(I+5, ' ', INFOTABLE[I+5, IROW], ' ');
  WRITE(I+10, ' ', INFOTABLE[I+10, IROW], ' ');
  WRITE(I+15, ' ', INFOTABLE[I+15, IROW]);
  WRITELN;
END;
WRITELN;
(*
WRITELN('THE CONTENTS OF THE USEDQ ARRAY');
FOR I:=0 TO 4 DO
BEGIN
  WRITE(I, ' ', USEDQ[I], ' ');
  WRITE(I+5, ' ', USEDQ[I+5], ' ');
  WRITE(I+10, ' ', USEDQ[I+10], ' ');
  WRITE(I+15, ' ', USEDQ[I+15], ' ');
  WRITELN;
END;
*)
PWORD:='LJ';
WRITELN;
WRITELN('PROCTOR : COPY DATA ON SCREEN ');
WRITELN('THEN ENTER PASSWORD :');
REPEAT
  READLN(PASSWORD);
UNTIL PASSWORD = PWORD;
WRITE(CHR(28));
END;

(*****
*) select a question from the information table based on the *)
*) examinees current ability level. *)
*) takes six parameters, 1. ability level used to find the *)
*) appropriate row, and 5 steps which specify the number of *)
*) questions to randomly select from for the nth question *)
*) all questions after the fifth question take on the fifth *)
*) step. *)
(*****)

FUNCTION INFOSELECT(ABILITY : REAL; S1,S2,S3,S4,S5 : INTEGER) : INTEGER;

VAR QSELECT,
    GETMAXQ,
    USED,
    ROW,
    COUNT,
    COLUMN : INTEGER;
    T : REAL;
    OKQ : BOOLEAN;
    SAVECOL,
    POOL : ARRAY[1..10] OF INTEGER;
BEGIN (* infoselect *)
  (* row based on 36 levels ranging from -2.250 to +2.125 *)
  (* ability rises 8x's slower than table index *)
  (* 19 is the offset into the table *)
  ROW := TRUNC((ABILITY * 8) + 19.5000000);
  IF STAY THEN
    ROW:=LEVEL;
  IF ROW > 36 THEN
    ROW := 36
  ELSE
    IF ROW < 1 THEN
      ROW := 1;
    if trace then
      begin
        gotoxy(8,8);

```

```

    blanklines(0,1,0);
    write('infotable row is ',row);
    readln;
end;

(* get the number of random questions to select the next quest. from *)
IF FIRSTQUESTION THEN
BEGIN
    GETMAXQ := S1;
END
ELSE
BEGIN
    GETMAXQ := S5; (* default *)
    CASE QNUM OF
        0 : GETMAXQ := S2;
        1 : GETMAXQ := S3;
        2 : GETMAXQ := S4;
    END;
END;

if trace then
begin
    gotoxy(0,0);
    blanklines(0,1,0);
    write('maximum # of random questions looked at ',getmaxq);
    readln;
end;

OKQ := FALSE;
REPEAT

    (* get the maximum # of questions not used already *)
    COLUMN := 1;
    COUNT := 0;
    REPEAT

        (* check if question previously used *)
        IF INFOTABLE [COLUMN,ROW] < 0 THEN (* infotable= -1 if the question *)
            (* is not available *)
            USED := 1
        ELSE
            USED := SEARCH(INFOTABLE [COLUMN,ROW]); (*search returns -1 if *)
            (* the question # is not in the array of used questions *)

            (* if question wasnt used save it *)
            IF USED < 0 THEN
            BEGIN
                COUNT := COUNT + 1;
                POOL [COUNT] := INFOTABLE [COLUMN,ROW];
                SAVECOL [COUNT] := COLUMN;
            END
            ELSE
                (*mark entry in table as used *)
                INFOTABLE [COLUMN,ROW] := -1 ;

            COLUMN := COLUMN + 1;
        UNTIL (COLUMN > 20) OR (COUNT >= GETMAXQ);

        IF (COLUMN > 20) AND (COUNT = 0) THEN
        BEGIN
            ERROR (ROW);
            ROW := ROW + 1;
            IF ROW > 36 THEN ROW := 35;
            LEVEL := ROW;
        END
        ELSE
        BEGIN
            (* randomly choose from available pool *)
            T := RANDOM;
            QSELECT := (TRUNC(T) MOD COUNT) + 1;
            INFOSELECT := POOL [QSELECT];
            OKQ := TRUE;
            COLUMN := SAVECOL [QSELECT];
        END
    END;

```

```

(* Save the row and column index for update of the infotable *)
(* once it is known if examinee answered right or wrong *)
IF RIGHT THEN
BEGIN
  SAVERC(1):= ROW;
  SAVERC(2):= COLUMN;
  RIGHT:= FALSE;
END
ELSE
BEGIN
  SAVERC(3):= ROW;
  SAVERC(4):= COLUMN;
  RIGHT:= TRUE;
END;

if trace then
begin
  gotoxy(0,0);
  blanklines(0,1,0);
  write('column is ',column);
  readln;
  gotoxy(0,0);
  qselect := pool[qselect];
  write('question is ',directory.itemcode[qselect]);
  readln;
end;

END;
UNTIL OKQ;
END; (* infoselect *)

```

```

(*-----*)
(* This function steps through randomly the *)
(* test directory and selects the first item *)
(* not previously given. There is no strategy *)
(* involved. *)
(*-----*)

```

```

FUNCTION NOSTRATSELECT : INTEGER;
VAR USED,
    SINDEX : INTEGER;
    OKQ : BOOLEAN;
BEGIN
  SINDEX := ONUM + MAXSAMPLES + 1;
  OKQ := FALSE;
  REPEAT
    IF DIRECTORY.ITEMCODE(SINDEX) >= 0 THEN
      BEGIN
        USED := SEARCH(SINDEX);
        IF USED < 0 THEN
          OKQ := TRUE
        END;
        IF NOT OKQ THEN
          SINDEX := SINDEX + 1;
        UNTIL (OKQ) OR (SINDEX >= MAXITEMPOOL);
        IF OKQ THEN
          NOSTRATSELECT := SINDEX
        ELSE
          BEGIN
            PAGE(OUTPUT);
            WRITE('No STRATEGY QUESTION SELECT ERROR!!!!');
            GOTOXY(0,10);
            STALL;
          END;
        END;
      END;
  END;
END; (* nostratselect *)

```

```

(* answer the displayed question *)
PROCEDURE ANSWERQUESTION;
VAR QANSWERED : INTEGER; (* number of questions answered *)

```

```

SAVEITEM : BOOLEAN;
BEGIN
  (*save get the answer and save the results save*)
  CASE ITEMINFO.ATYPE OF
    CHARVALUE : BEGIN
      IF ITEMINFO.GRAPHICS THEN
        CHRANS := GGETCHRANSWER(4,ACODE)
      ELSE
        CHRANS := GETCHRANSWER(4,ACODE);
      IF ACODE = 1 THEN
        BEGIN
          SAVEITEM := TRUE;

          (* update record *)
          IF CURRSTRAT = TIMED THEN
            BEGIN
              STOP := TIME;
              TESTS.ITEMINFO(ONUM).LATENCY := ABS(START-STOP);
              ELASPEDTIME := ELASPEDTIME + (TRUNC(ABS(START-STOP)));
              IF ELASPEDTIME >= MAXTIME THEN
                SAVEITEM := FALSE;
            END;
          IF SAVEITEM THEN
            BEGIN
              TESTS.MODSTTIME := ELASPEDTIME;
              TESTS.ITEMINFO(ONUM).RTYPE := CHARVALUE;
              TESTS.ITEMINFO(ONUM).RESPONSE := CHRANS;
              TESTS.ITEMINFO(ONUM).ITEMNUM := QSTCODE;
              TESTS.NUMITEMS := TESTS.NUMITEMS + 1;
              IF CHRANS = ITEMINFO.ANSWER THEN
                BEGIN
                  TESTS.NUMCORR := TESTS.NUMCORR + 1;
                  TESTS.ITEMINFO(ONUM).CORRECT := TRUE;
                  IF (CURRSTRAT = B102222) OR
                     (CURRSTRAT = B54321) OR
                     (CURRSTRAT = B108642) THEN
                    BEGIN
                      OPREFETCH := RITEPREFETCH;
                      CURRABILITY := RITEABILITY;
                      CURRVARIANCE := RITEVARIANCE;
                      RIGHT := TRUE;
                    END;
                  END;
                ELSE
                  BEGIN
                    TESTS.ITEMINFO(ONUM).CORRECT := FALSE;
                    IF (CURRSTRAT = B102222) OR
                       (CURRSTRAT = B54321) OR
                       (CURRSTRAT = B108642) THEN
                      BEGIN
                        OPREFETCH := WRONGPREFETCH;
                        CURRABILITY := WRONGABILITY;
                        CURRVARIANCE := WRONGVARIANCE;
                        RIGHT := FALSE;
                      END;
                    END;
                  END;
                END;
              END;
            END;
          END;
        END;
      END;
    INTVALUE : BEGIN
      IF ITEMINFO.GRAPHICS THEN
        INTANS := GGETINTANSWER(4,ACODE)
      ELSE
        INTANS := GETINTANSWER(4,ACODE);
      IF ACODE = 1 THEN
        BEGIN
          SAVEITEM := TRUE;
          IF CURRSTRAT = TIMED THEN
            BEGIN
              STOP := TIME;
              TESTS.ITEMINFO(ONUM).LATENCY := ABS(START-STOP);
              ELASPEDTIME := ELASPEDTIME + (TRUNC(ABS(START-STOP)));
            END;
          END;
        END;
      END;
    END;
  END;

```

```

        IF ELASPEDTIME >= MAXTIME THEN
            SAVEITEM := FALSE;
        END;
        IF SAVEITEM THEN
            BEGIN
                TESTS.MOOSTTIME := ELASPEDTIME;
                TESTS.ITEMINFO(QNUM).RTYPE := INTVALUE;
                TESTS.ITEMINFO(QNUM).INTRESPONSE := INTANS;
                TESTS.ITEMINFO(QNUM).ITEMNUM := QSTCODE;
                TESTS.NUMITEMS := TESTS.NUMITEMS + 1;
                IF INTANS = ITEMINFO.INTANSWER
                THEN
                    BEGIN
                        TESTS.NUMCORR := TESTS.NUMCORR + 1;
                        TESTS.ITEMINFO(QNUM).CORRECT := TRUE;
                        IF (CURRSTRAT = B102222) OR
                            (CURRSTRAT = B54321) OR
                            (CURRSTRAT = B108642) THEN
                            BEGIN
                                QPREFETCH := RITEPREFETCH;
                                CURRABILITY := RITEABILITY;
                                CURRVARIANCE := RITEVARIANCE;
                                RIGHT := TRUE;
                            END;
                        END
                    ELSE
                        BEGIN
                            TESTS.ITEMINFO(QNUM).CORRECT := FALSE;
                            IF (CURRSTRAT = B102222) OR
                                (CURRSTRAT = B54321) OR
                                (CURRSTRAT = B108642) THEN
                                    BEGIN
                                        QPREFETCH := WRONGPREFETCH;
                                        CURRABILITY := WRONGABILITY;
                                        CURRVARIANCE := WRONGVARIANCE;
                                        RIGHT := FALSE;
                                    END;
                                END;
                            END;
                        END;
                    END;
                END;
            END;
        SEVENCHR : BEGIN
            QCOUNT := ITEMINFO.ANSWERCOUNT;
            IF ITEMINFO.GRAPHICS THEN
                GETSEVENANSWERS(1,QCOUNT,4,CURRTEST,
                                QSTCODE,S7ANS,ACODE,
                                QANSWERED)
            ELSE
                GETSEVENANSWERS(1,QCOUNT,4,BLK,BLKPTR,S7ANS,ACODE,
                                QANSWERED);
            IF QANSWERED > 0 THEN
                BEGIN
                    IF ACODE = 1 THEN
                        BEGIN
                            IF CURRSTRAT = TIMED THEN
                                BEGIN
                                    STOP := TIME;
                                    ELASPEDTIME := ELASPEDTIME +
                                                            (TRUNC(ABS(START-STOP)));
                                    IF ELASPEDTIME >= MAXTIME THEN
                                        TESTS.ITEMINFO(QNUM).LATENCY := ABS(START-STOP) -
                                                                (ELASPEDTIME - MAXTIME)
                                    ELSE
                                        TESTS.ITEMINFO(QNUM).LATENCY := ABS(START-STOP);
                                    END;
                                TESTS.ITEMINFO(QNUM).RTYPE := SEVENCHR;
                                TESTS.ITEMINFO(QNUM).CHRRRESPONSE := S7ANS;
                                TESTS.ITEMINFO(QNUM).ITEMNUM := QSTCODE;
                                TESTS.NUMITEMS := TESTS.NUMITEMS + QANSWERED;
                                TESTS.ITEMINFO(QNUM).ACOUNT := QANSWERED;
                                FOR I := 1 TO QANSWERED DO
                                    BEGIN

```

```

        IF S7ANS[I] = ITEMINFO.CHRANSWER[I] THEN
        BEGIN
            TESTS.NUMCORR := TESTS.NUMCORR + 1;
            TESTS.ITEMINFO(QNUM).ACORRECT[I-1] := TRUE;
        END
        ELSE
            TESTS.ITEMINFO(QNUM).ACORRECT[I-1] := FALSE;
        END;
    END;
END;
END;
END;
END; (* case *)
END; (* answer question *)

```

```

(* precalculating to get next question *)
PROCEDURE PRECALCULATE;
BEGIN

```

```

    (* set current ability and variance for prefetch *)
    RITEABILITY := CURRABILITY;
    WRONGABILITY := CURRABILITY;
    RITEVARIANCE := CURRVARIANCE;
    WRONGVARIANCE := CURRVARIANCE;

```

```

    (* calculate abilities if answered wrong and right *)
    (* THIS ROUTINE IS SKIPPED IF THE STAY ROUTINE IS USED *)
    IF NOT STAY THEN
        UPDATEABILITY(TRUE);

```

```

    (* calculate next question if examinee answers current one correctly *)
    CASE CURRSTRAT OF
        B102222 : RITEPREFETCH := INFOSELECT(RITEABILITY,10,2,2,2,2);
        B54321 : RITEPREFETCH := INFOSELECT(RITEABILITY,5,4,3,2,1);
        B108642 : RITEPREFETCH := INFOSELECT(RITEABILITY,10,8,6,4,2);
    END;

```

```

    (* calculate next question if examinee answers current one wrong *)
    CASE CURRSTRAT OF
        B102222 : WRONGPREFETCH := INFOSELECT(WRONGABILITY,10,2,2,2,2);
        B54321 : WRONGPREFETCH := INFOSELECT(WRONGABILITY,5,4,3,2,1);
        B108642 : WRONGPREFETCH := INFOSELECT(WRONGABILITY,10,8,6,4,2);
    END;
END;

```

```

BEGIN (* administer question *)

```

```

CASE CURRSTRAT OF
    NONE,
    TIMED : QSLT := NOSTRATSELECT;
    B102222 : IF FIRSTQUESTION THEN
        BEGIN
            QSLT := INFOSELECT(CURRABILITY,10,2,2,2,2);
            FIRSTQUESTION := FALSE;
            RIGHT := TRUE;
        END
        ELSE
            QSLT := OPREFETCH;
    B54321 : IF FIRSTQUESTION THEN
        BEGIN
            QSLT := INFOSELECT(CURRABILITY,5,4,3,2,1);
            FIRSTQUESTION := FALSE;
            RIGHT := TRUE;
        END
        ELSE
            QSLT := OPREFETCH;
    B108642 : IF FIRSTQUESTION THEN
        BEGIN
            QSLT := INFOSELECT(CURRABILITY,10,8,6,4,2);
            FIRSTQUESTION := FALSE;

```

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MICROCOMPUTER NETWORK FOR COMPUTERIZED ADAPTIVE TESTING 2/5

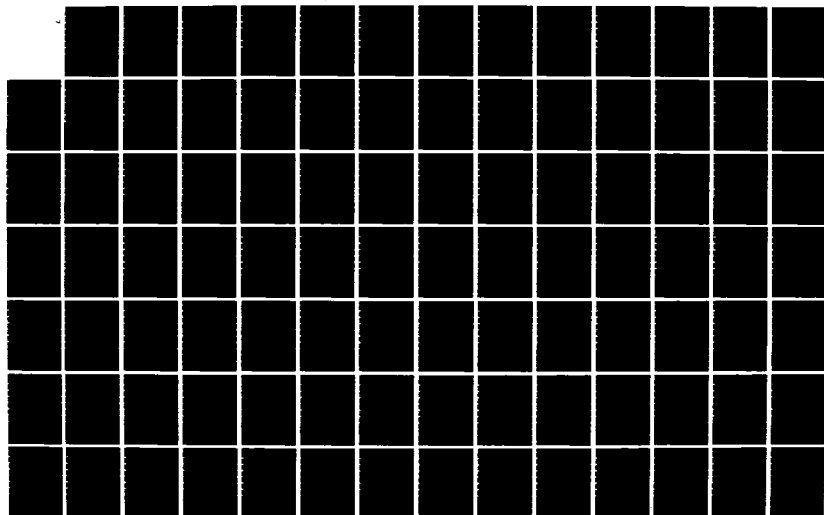
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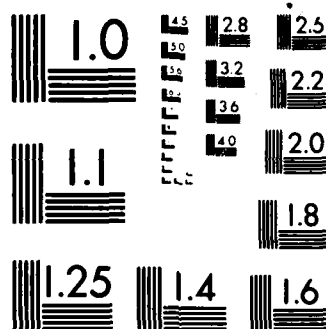
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NL





MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

```

        RIGHT:= TRUE ;
      END
    ELSE
      QSLLOT := QPREFETCH;
END;

(*
if trace then
begin
  writeln;
  writeln;
  writeln('Question selected = ',qstcode);
  writeln;
  stall;
end;
*)

USEDQ(QNUM) := QSLLOT; (* keep track of used questions *)

(* Mark question as use in the infotable *)
IF RIGHT THEN
  INFOTABLE(SAVERC(2),SAVERC(1)):= -1
ELSE
  INFOTABLE(SAVERC(4),SAVERC(3)):= -1;
RIGHT := TRUE;

QSTCODE := DIRECTORY.ITEMCODE(QSLLOT); (* save code # *)

IF QSTCODE >= 0 THEN (* question exists *)

  (**** show question ****)
  BEGIN

    if trace then
    begin
      gotoxy(0,0);
      blanklines(0,1,0);
      write('item selected is ',qstcode);
      readln;
    end;

    DATASLOT := HASH(QSLLOT); (* find question data record # *)

    (* get the question data *)
    RESET(FILEITEMINFO,DATANAME);
    SEEK(FILEITEMINFO,DATASLOT);
    GET(FILEITEMINFO);
    ITEMINFO := FILEITEMINFO^;
    CLOSE(FILEITEMINFO,LOCK);

    (* get pointers to find text *)
    BLK := ITEMINFO.ITEMBLOCK;
    BLKPTR := ITEMINFO.ITEMPTR;

    DONE := FALSE;
    GATE := TRUE;
    REPEAT

      (* set flow to normal *)
      ACODE := 1;

      (* display the text *)
      IF ITEMINFO.GRAPHICS THEN
      BEGIN
        GRAFIX := TRUE;
        FILLPORT;
        GOCODEPRINT(CURRTEST,QSTCODE);
        PAGE(OUTPUT);
      END
      ELSE
      BEGIN
        DECODEPRINT(BLK,BLKPTR); (* display the question *)

```

```

UNITCLEAR(2);      (* flush the keyboard buffer *)
END;

(* prefetching of the next question while examinee is reading the *)
(* current question . *)
IF (CURRSTRAT = B102222) OR
   (CURRSTRAT = B54321) OR
   (CURRSTRAT = B108642) THEN
    PRECALCULATE;

(* start the timer for timed tests *)
IF (CURRSTRAT = TIMED) AND (GATE) THEN
BEGIN
    GATE := FALSE;
    START := TIME;
END;

(* get the examinee response to question *)
ANSWERQUESTION;

TEXTON;
GRAFIX := FALSE;

IF ACODE = 1 THEN
    DONE := TRUE;

(* if taking a timed test, and time is used up *)
IF ((CURRSTRAT = TIMED) AND (ELAPSEDTIME >= MAXTIME)) OR (TIMEOUT) THEN
BEGIN
    PAGE(OUTPUT);
    GOTOXY(1,8);
    WRITE('Your time has expired for this subtest. ');
    GOTOXY(0,10);
    FLOWCODE := 5;
    STALL;
    TESTS.MODSTTIME := MAXTIME;
    EXIT(ADMINISTERQUESTION);
END;

CASE ABS(ACODE) OF
    (* wants to leave test *)
    5,7 : EXIT(ADMINISTERQUESTION);

    (* wants to leave session *)
    6   : DONE := TRUE;
END;

UNTIL (DONE) AND (ACODE = 1);
(* if examinee wants to leave session, must first answer *)
(* the question. If wants to leave subtest, doesn't have *)
(* to answer the question. *)
END
ELSE
BEGIN
    PAGE(OUTPUT);
    SQUAWK;
    WRITELN('Question load error !!! No such question in directory !!!');
    WRITELN;
    WRITELN('Tried to load question # ',QSTCODE);
    WRITELN('Directory slot ',QSLLOT);
    WRITELN;
    STALL;
END;
END; (* administer question *)

```

```
(*****)
(*)
(*)      Textfile : ADMIN.DIR/A.UABIL.TEXT      Volume : TFILES      (*)
(*)      Codefile : ADMIN.CODE ('Include' file) Volume : CATDATA      (*)
(*)
(*)*****
(*)      DEC. 1, 1982      NPROC      (*)
(*)*****
```

```
(* updates examinee ability level and variance of estimate *)
PROCEDURE UPDATEABILITY(PREFETCH : BOOLEAN);
```

```
(* computes the examinees ability based on previous ability, *)
(* variance, question abc parameters and how he answered *)
(* the question. *)
```

```
PROCEDURE BAYSIAN(VAR ABILITY,VARIANCE : REAL; A,B,C : REAL;
ANSWEROK : BOOLEAN);
VAR SS,S,X,R,P,D : REAL;
```

```
(*****)
(* computes y = p(x) = probability that the random variable u, *)
(* distributed normally (0,1), is less than or equal to x. f(x)*)
(* the ordinate of the normal density at x, is also computed *)
(*)
(*) description of parameters : xcoord -- input scalar for which*)
(*)                          p(x) is computed. *)
(*)                          probability---output probability*)
(*)                          density---output density *)
(*) minimum error is .0000007. *)
(*) method : based on approximations in c. hastings, *)
(*) approximations for digital computers, princeton *)
(*) univ press, n.j., 1955, see equation 26.2.17, *)
(*) handbook of mathematical functions, abramowitz and *)
(*) stegun, dover publications, inc., new york. *)
(*)*****
```

```
PROCEDURE NORMALDENSITY(XCOORD : REAL; VAR PROBABILITY,DENSITY : REAL);
```

```
VAR AX,
TEMP,
AVGSQ : REAL;
BEGIN
AX := ABS(XCOORD);
TEMP := 1.0 / (1.0 + 0.2316419 * AX);
AVGSQ := -XCOORD * XCOORD / 2.0;
DENSITY := 0.3989423 * EXP(AVGSQ);
PROBABILITY := 1.0 - DENSITY * TEMP *
(((1.330274 * TEMP - 1.821256) * TEMP + 1.781478)
* TEMP - 0.3565638) * TEMP + 0.3193815);
IF XCOORD < 0 THEN
PROBABILITY := 1.0 - PROBABILITY;
END; (* normal density *)
```

```
BEGIN (* bayesian *)
SS := VARIANCE + 1.0 / SQR(A);
S := SQR(SS);
X := (ABILITY - B) / S;
NORMALDENSITY(X,P,D);
IF ANSWEROK THEN
R := D / (P + C / (1.0 - C))
ELSE
R := -D / (1.0 - P);
ABILITY := ABILITY + R * VARIANCE / S;
VARIANCE := VARIANCE - SQR(VARIANCE) * R * (R + X) / SS;
END; (* bayesian *)
```

```
BEGIN (* update ability *)
```

```

(
if trace then
begin
  writeln;
  writeln('Old ability = ',currability);
  writeln('Old variance = ',currvariance);
end;
)

CASE CURRSTRAT OF
  NONE,
  TIMED      : ;
  B102222,
  B54321,
  B108642    : BEGIN
    IF PREFETCH THEN
    BEGIN
      BAYSIAN(RITEABILITY,
              RITEVARIANCE,
              ITEMINFO.A,ITEMINFO.B,ITEMINFO.C,
              TRUE);
      BAYSIAN(WRONGABILITY,
              WRONGVARIANCE,
              ITEMINFO.A,ITEMINFO.B,ITEMINFO.C,
              FALSE);
    END
    ELSE
    BEGIN
      BAYSIAN(CURRABILITY,
              CURRVARIANCE,
              ITEMINFO.A,ITEMINFO.B,ITEMINFO.C,
              TESTS.ITEMINFO(QNUM).CORRECT);
      TESTS.ITEMINFO(QNUM).THETA := CURRABILITY;
      TESTS.ITEMINFO(QNUM).ERROR := CURRVARIANCE;
    END;
  END;
END;

(
if trace then
begin
  writeln;
  writeln('A parameter = ',iteminfo.a);
  writeln('B parameter = ',iteminfo.b);
  writeln('C parameter = ',iteminfo.c);
  writeln;
  if tests.iteminfo(qnum).correct then
    writeln('Answered correctly : yes')
  else
    writeln('Answered correctly : no');
  writeln;
  writeln('New ability = ',tests.iteminfo(qnum).theta);
  writeln('New variance = ',tests.iteminfo(qnum).error);
  writeln;
  stall;
end;
)
END;  (* update ability *)

```

```
(*****)
(*)
(*)      Textfile : ADMIN.DIR/A.FBACK.TEXT      Volume : TFILES      (*)
(*)      Codefile : ADMIN.CODE ('Include' file) Volume : CATDATA      (*)
(*)
(*****)
(*) File last modified : Jan 28, 1983      NPRDC      (*)
(*****)
```

```
SEGMENT PROCEDURE FEEDBACK(FBTYPE : TYPEFEEDBACK;
                           FBCODE, OUTPUTCODE : INTEGER);
```

```
(* item feedback *)
PROCEDURE ITEMFEEDBACK;
VAR DUMMYCHAR : CHAR;
BEGIN
  CASE FBCODE OF
    1 : BEGIN
        BLANKLINES(21,3,21);
        WRITE('The correct answer is ',ITEMINFO.ANSWER);
        GOTOXY(0,23);
        STALL;
      END;
```

```
    2 : ; (* remedial feedback *)
  END; (* case *)
END; (* item feedback *)
```

```
(* subtest feedback *)
PROCEDURE SUBTFEEDBACK(SUBF,SUBOUT : INTEGER);
VAR TORDER : STRING;
```

```
(* send detailed or simple feedback to printer or screen *)
PROCEDURE OUTPUTRESULTS(PRINTER : BOOLEAN;
                        E : EXAMINFO;
                        T : SUBTEST;
                        STNUM : INTEGER);
VAR I : INTEGER;
```

```
(* graphical detailed feedback *)
PROCEDURE GRAPHDISPLAY;
VAR X : INTEGER;
    ANSWER : CHAR;
    RANK : REAL;
```

```
(* calculate percentile rank based on ability *)
PROCEDURE PERCENTILE(XCOORD : REAL;
                     VAR PROBABILITY : REAL);
VAR AX,
    TEMP,
    DENSITY,
    AVGSQ : REAL;
BEGIN
  AX := ABS(XCOORD);
  TEMP := 1.0 / (1.0 + 0.2316419 * AX);
  AVGSQ := -XCOORD * XCOORD / 2.0;
  DENSITY := 0.3989423 * EXP(AVGSQ);
  PROBABILITY := 1.0 - DENSITY * TEMP *
    (((1.330274 * TEMP - 1.821256) * TEMP + 1.781478)
     * TEMP - 0.3565638) * TEMP + 0.3193815);
  IF XCOORD < 0 THEN
    PROBABILITY := 1.0 - PROBABILITY;
  PROBABILITY := PROBABILITY * 100.0;
END; (* percentile *)
```

```
(* plots the graph *)
PROCEDURE EPLLOT;
VAR POSITION : PACKED ARRAY[-30..30] OF CHAR;
    EST      : INTEGER;
    Z        : INTEGER;
    VARIANCE : INTEGER;
    NUM      : INTEGER;
    THETA10  : REAL;
    ERROR10  : REAL;

BEGIN (* eplot *)
    NUM := 0;
    FOR X := 0 TO QUESTIONS DO
        BEGIN
            IF T.ITEMINFO(X).ITEMNUM >= 0 THEN
                WITH T.ITEMINFO(X) DO
                    BEGIN
                        NUM := NUM + 1;
                        FILLCHAR(POSITION,61,' ');
                        THETA10 := THETA * 10;
                        EST := ROUND(THETA10);
                        IF CORRECT = TRUE THEN
                            POSITION(EST) := 'X'
                        ELSE
                            POSITION(EST) := 'O';
                        ERROR10 := ERROR * 10;
                        VARIANCE := ROUND(ERROR10);
                        FOR Z := 1 TO VARIANCE DO
                            BEGIN
                                POSITION(EST+Z) := '.';
                                POSITION(EST-Z) := '.';
                            END;
                        WRITE(DEST,POSITION);
                        WRITE(DEST,THETA:4:2);
                        WRITE(DEST,' ',ERROR:4:2);
                        PERCENTILE(THETA,RANK);
                        WRITELN(DEST,' ',RANK:3:1);
                    END; (* with *)
                END; (* for *)
            IF PRINTER THEN
                BEGIN
                    WRITELN(DEST);
                    WRITELN(DEST,' ':20,NUM,
                        ' Items were administered');
                    WRITELN(DEST);
                END;
        END; (* eplot *)

BEGIN (* graphdisplay *)
    IF PRINTER THEN
        BEGIN
            WRITE(DEST,' ':24,'Report on ');
            WRITE(DEST,TOROE);
            WRITELN(DEST,' ','Test');
            WRITE(DEST,'ID Number: ');
            WRITE(DEST,E.ID);
            WRITELN(DEST);
            WRITELN(DEST,' ':24,'X = Correct', ' ':12,
                'O = Incorrect');

            WRITELN(DEST,' ':7,
                'Error Band Plotted is + and - Standard Devia ion');
            WRITELN(DEST);
        END;

    IF PRINTER THEN
        WRITELN(DEST,
            ' ':25, 'Ability Level')
    ELSE

```

```

        WRITELN(DEST, ' Test : ', TORDER,
        ' Ability Level (X=right, 0=wrong)');

        WRITELN(DEST,
        ' -2.5 -2.0 -1.5 -1.0 -0.5 0.0 0.5 1.0 1.5 2.0 2.5',
        ' Ability ');
        WRITELN(DEST,
        ' |-----|-----|-----|-----|-----|-----|-----|',
        ' |----| Est Var Rank %');

```

```

        EPLLOT;
    END; (* graphdisplay *)

```

```

(* simple summary *)
PROCEDURE SIMPLESUMMARY;
BEGIN
    WRITELN(DEST);
    WRITE(DEST, ' :24, Report on ');
    WRITE(DEST, TORDER);
    WRITELN(DEST, ' ', 'Test');
    WRITELN(DEST);
    WRITELN(DEST, ' Examinee : ', E.ID);
    (WRITE(DEST, ' # of screens in test : ',
    EXAMINEE.TESTLENGTH(STNUM));)
    WRITE(DEST, ' # of items answered : ', T.NUMITEMS);
    WRITELN(DEST, ' # correct : ', T.NUMCORR);
    WRITELN(DEST);
END; (* simple summary *)

```

```

(* table the results *)
PROCEDURE TABLEDISPLAY;
BEGIN
    IF PRINTER THEN
        SIMPLESUMMARY;
    IF NOT PRINTER THEN
        BEGIN
            GOTOXY(28,1);
            WRITE(' Report on ');
            GOTOXY(28,2);
            WRITE(TORDER);
            GOTOXY(26,5);
            (WRITE(' # of screens in test : ',
            EXAMINEE.TESTLENGTH(STNUM));)
            GOTOXY(26,6);
            WRITE(' # of items answered : ', T.NUMITEMS);
            GOTOXY(26,7);
            WRITE(' # correct : ', T.NUMCORR);
            GOTOXY(26,18);
        END;
    END; (* table display *)

```

```

BEGIN (* outputresults *)
    IF T.NUMITEMS > 0 THEN
        BEGIN
            IF PRINTER THEN
                REWRITE(DEST, UNITNUMPRINTER)
            ELSE
                REWRITE(DEST, 'CONSOLE : ');

            IF NOT PRINTER THEN
                PAGE(OUTPUT);

            RESET(FILEDIRECTORY, INDEXNAME);
            SEEK(FILEDIRECTORY, SPARAMS.SUBORDER(STNUM));

```

```

GET(FILEDIRECTORY);
TORDER := FILEDIRECTORY^.TESTNAME;
CLOSE(FILEDIRECTORY,LOCK);

CASE CURRSTRAT OF
  NONE : SIMPLSUMMARY;
  B102222,
  B54321,
  B108642 : GRAPHDISPLAY;
  TIMED : TABLEDISPLAY;
END;

IF NOT PRINTER THEN
  STALL;
CLOSE(DEST,NORMAL);
END;
END; (* outputresults *)

BEGIN (* subtest feedback *)
CASE SUBOUT OF
  1 : OUTPUTRESULTS(FALSE,EXAMINEE,TESTS,TINDEX);
  2,3 : OUTPUTRESULTS(TRUE,EXAMINEE,TESTS,TINDEX);
  4,5 : BEGIN
        OUTPUTRESULTS(FALSE,EXAMINEE,TESTS,TINDEX);
        OUTPUTRESULTS(TRUE,EXAMINEE,TESTS,TINDEX);
      END;
END;
END; (* subtestfeedback *)

```

```

(* session feedback *)
PROCEDURE SESSIONFEEDBACK;
VAR RSL0T : INTEGER;
BEGIN

  (* get location of first subtest *)
  RSL0T := ERECNUM * GMAXSUBTEST;

  (* display results of each subtest *)
  FOR TINDEX := 1 TO GMAXSUBTEST DO
    BEGIN
      (* get strategy to display appropriate feedback *)
      CURRSTRAT := EXAMINEE.STRATEGY(TINDEX);

      (* load results into record *)
      LOADRESULTS(RSL0T);

      (* if any questions answered *)
      IF TESTS.NUMITEMS > 0 THEN
        BEGIN
          CASE OUTPUTCODE OF
            1 : SUBTFEEDBACK(1,1);
            2 : SUBTFEEDBACK(1,2);
            3 : SUBTFEEDBACK(1,4);
          END;
        END;
      RSL0T := RSL0T + 1;
    END; (* for *)
  END; (* session feedback *)

```

```

BEGIN (* feedback *)

```

```

  IF OUTPUTCODE <> 0 THEN
    BEGIN

```

```
(* cannot give session feedback to demos *)
IF (DEMOFLAG) AND (FBTYPE = FBSESSION) THEN
  EXIT(FEEDBACK);

IF (FBTYPE = FBSUBTEST) OR (FBTYPE = FBSESSION) THEN
  BEGIN
    TEXT80MODE;
    INVERSE;
  END;
CASE FBTYPE OF
  FBITEM : ITEMFEEDBACK;
  FBSUBTEST : SUBTFEEDBACK(FBCODE,OUTPUTCODE);
  FBSESSION : SESSIONFBACK;
END;
IF (FBTYPE = FBSUBTEST) OR (FBTYPE = FBSESSION) THEN
  BEGIN
    TEXT40MODE;
    INVERSE;
  END;
END;
END; (* feedback *)
```

```

(*****)
(*)
(*)      Textfile : ADMIN.DIR/A.PASVAB.TEXT      Volume : TFILES      (*)
(*)      Codefile : A.PASVAB.CODE                Volume : CATDATA    (*)
(*)
(*****)
(*)      June 10, 1983                          NPROC              (*)
(*****)
(*) This function receives a theta (CURRABILITY) level for a certain *)
(*) subtest, and returns a value representing the predicted ASVAB  *)
(*) score for a pencil/paper test. The score is obtained through a *)
(*) 'table look-up' from a file of records corresponding to a particular *)
(*) subtest. The lookup is done by using the theta value as a key *)
(*) to the appropriate record in the file. For example, if theta=2.70 or -2.70*)
(*) then slot #7 in record #2 will contain the score to be accessed. *)
(*) Each of the score slots correspond to theta values 0.1 apart, e.g. *)
(*) thetas of 4.80,4.90, occupy record #4 slots #8,9 respectively. For *)
(*) thetas to the 0.01 place, two lookups will take place, one for the *)
(*) slot below and for the slot above- for theta of 2.392 record #2 *)
(*) 3 and 4 will be accessed. This will be followed by a simple linear *)
(*) interpolation of the two values resulting in an approximate score *)
(*) accurate to +-0.01. *)

```

FUNCTION PREASVABCALC (THETA:REAL):REAL;

```

CONST
  MAXREC=5;
  MAXSLOT=9;

```

```

TYPE
  THETAREC=RECORD
    P:PACKED ARRAY(0..MAXSLOT)OF REAL; (* P- positive thetas *)
    N:PACKED ARRAY(0..MAXSLOT)OF REAL; (* N- negative thetas *)
  END;
VAR
  SCOREC:THETAREC;
  SCORE,Z:REAL;
  C,I,J,Y:INTEGER;
  SCOREFILE:FILE OF THETAREC;
  CONT,POS:BOOLEAN;
  HIGH,LOW,THETA1:REAL;

```

FUNCTION INTERP(LOW,HIGH:REAL):REAL;

BEGIN

```

  SCORE:=(THETA - THETA1)/0.1;      (* INTERPOLATE *)
  INTERP:=(SCORE * (HIGH-LOW)) + LOW;
  END; (* interp *)

```

```

PROCEDURE SEEKREC(Y:INTEGER);
  VAR X:INTEGER;

```

```

  BEGIN
    FOR X:= 0 TO Y DO      (* SIMULATE SEEK FUNCTION *)
      GET(SCOREFILE);
      SCOREC :=SCOREFILE^;
      RESET(SCOREFILE);
    END;
    (* seekrec *)

```

PROCEDURE GETSCORE;

BEGIN (\* getscore \*)

IF POS THEN

```

BEGIN
  SCORE:=SCOREC.P(C);
  IF Y=MAXREC THEN
    POS:=FALSE; (* IF POS ASSERTED, CHANGE BACK *)
  END
  ELSE
    SCORE:=SCOREC.N(C);
  END; (* getscore *)

```

PROCEDURE GETADDRESS(VAR THETA:REAL);

BEGIN (\* getaddress \*)

```

  IF THETA < 0 THEN POS:=FALSE;
  THETA:= ABS(THETA);
  Y:=TRUNC(THETA);
  Z:=THETA - Y;
  Z:=(Z * 10) + 0.000444;
  C:=TRUNC(Z);
  IF (NOT POS) AND (Y >= 6) (* THETA IS -6; GOTO RECORD #5 *)
  THEN
    BEGIN
      POS:=TRUE; (* CHANGE POS TO GET LAST REC *)
      Y := MAXREC;
      IF THETA1 >= 6.9 THEN
        BEGIN
          C := MAXSLOT;
          CONT:=FALSE;
        END;
      END
    ELSE IF POS AND (THETA1 >= 4.9)
    THEN
      BEGIN
        Y:=MAXREC-1;
        C:=MAXSLOT;
        CONT:=FALSE;
      END;
    END; (* getaddress *)

```

PROCEDURE LOOKUP(VAR THETA:REAL);

BEGIN (\* lookup \*)

```

  GETADDRESS(THETA);
  SEEKREC(Y);
  GETSCORE;
  IF CONT THEN
    BEGIN
      LOW:=SCORE;
      HIGH:=THETA1 + 0.1;
      GETADDRESS(HIGH);
      SEEKREC(Y);
      GETSCORE;
      HIGH:=SCORE;
      SCORE:=INTERP(LOW,HIGH)
    END;
  CLOSE(SCOREFILE);
  END; (* lookup *)

```

BEGIN (\* preasvabcalc \*)

```

CASE CURRTEST OF
  0: RESET(SCOREFILE, '/CATDATA/WKTABLE.DATA');
  1: RESET(SCOREFILE, '/CATDATA/GSTABLE.DATA');
  2: RESET(SCOREFILE, '/CATDATA/ARTABLE.DATA');
  3: RESET(SCOREFILE, '/CATDATA/MKTABLE.DATA');
  4: RESET(SCOREFILE, '/CATDATA/PCTABLE.DATA');
  OTHERWISE EXIT(PREASVABCALC)
END; (*cases*)

```

```
CONT:=TRUE;
POS:=TRUE;
THETA1:= ABS(TRUNC(THETA * 10)/10); (* preserve tenths place;truncate rest*)
IF ABS(THETA)=THETA1
THEN CONT:=FALSE;
LOOKUP(THETA);

PREASVABCALC:= SCORE;
END;      (* preasvabcalc *)
```

**PMGR.DIR:**  
**Subdirectory - Parameter Management Textfiles**



```

(*)
(*)
(*)      Textfile : PMGR.DIR/P.MGR.TEXT          Volume : TFILES          (*)
(*)      Codefile : P.MGR.CODE                  Volume : CATDATA          (*)
(*)
(*)
(*)
(*) File last modified : Jan 31, 1983          NPRDC          (*)
(*)
(*)
(*) This program sets up one file for the CAT program. The file is the testing (*)
(*) strategies & parameters given to examinees.          (*)
(*)
(*)
(*)

```

(\*\$S+\*)

PROGRAM SYSTEMSETUP;  
USES CHAINSTUFF;

CONST (\* ascii values \*)

```

BELL = 7;
LARROW = 8;
RARROW = 21;
RET = 13;
ESC = 27;
SPACE = 32;
ASCIIOFFSET = 48;
NIL = -1;

```

(\* default file for any output text files \*)  
DEFAULTFILE = 'CAT-SETUP.TEXT';

(\* test configuration file \*)  
SETUPDATA = 'CATDATA:PARAMETERS.DATA'; (\* test default parameters \*)

(\* subtest directory \*)  
INDEXNAME = 'CATDATA:TESTINDEX.DATA';

MAXITEMPOOL = 300;

(\* maximum allowable subtests given \*)  
GMAXSUBTEST = 20;

(\* maximum spaces in directory \*)  
MAXSUBTESTS = 20;

(\* printer unit number \*)  
UNITNUMPRINTER = 'printer';

VERSION = '(1.03)';

TYPE SETOFCHAR = SET OF CHAR;

(\* test directory \*)

```

DIRDATA = PACKED RECORD
    UNUSED      : BOOLEAN;
    TESTNAME    : STRING;
    ITEMCODE    : PACKED ARRAY
                  (0..MAXITEMPOOL)
                  OF INTEGER;

```

END;

(\* set-up parameters \*)  
SETUPINFO = PACKED RECORD

(\* flags # tests in sequence, > 20 = no subtest \*)  
SUBORDER,

(\* strategy setup \*)  
SUBSTRAT : PACKED ARRAY(1..GMAXSUBTEST)  
 OF 0..128;

```

(* question feedback code *)
ITEMFB,

(* question feedback output code *)
ITEMOUTPUT,

(* subtest feedback code *)
SUBTESTFB,

(* subtest feedback destination code *)
SUBTESTOUTPUT,

(* session feedback code *)
SESSIONFB,

(* session feedback destination; screen/printer *)
SESSIONOUTPUT : 0..128;

(* subtest stop flag *)
SUBSTOP      : PACKED ARRAY[1..GMAXSUBTEST] OF BOOLEAN;

(* subtest length *)
SUBLENGTH    : PACKED ARRAY[1..GMAXSUBTEST]
              OF 0..128;

(* initial variance *)
CKERROR      : ARRAY[1..GMAXSUBTEST] OF REAL;

END;

```

```

VAR output,
    COMMAND : CHAR;

    DIGITS,
    LETTERS,
    CHARACTERS : SETOF CHAR;

    TEMPNAMEORDER,
    NAMEORDER   : ARRAY[1..GMAXSUBTEST] OF STRING;

```

```

(* string buffer *)
LINEBUF : PACKED ARRAY[0..79] OF CHAR;

```

```

(* test directory *)
DIRECTORY : DIRDATA;
FILEDIRECTORY : FILE OF DIRDATA;

```

```

(*** set-up variables ***)
SPARAMS : SETUPINFO;
FILESPARAMS : FILE OF SETUPINFO;

```

```

(* output text file variable *)
DEST : TEXT;

```

```

(* directory record information *)
DIRINFO : ARRAY[0..MAXSUBTESTS] OF RECORD

```

```

    (* record occupied *)
    NOTUSED : BOOLEAN;

```

```

    (* subtest name *)
    TNAME : STRING;

```

```

    (* # items in subtest *)
    ITEMCOUNT : INTEGER;

```

```

END;

```

```

(* ..... *)

(* writes the directory information to record *)
(* puts necessary file info in main memory *)
PROCEDURE GETDIRINFO;
VAR I,K,ICOUNT : INTEGER;
BEGIN

    (* initialize the directory information *)
    FOR I := 0 TO MAXSUBTESTS DO
        DIRINFO[I].NOTUSED := TRUE;

    (* get the directory information *)
    I := 0;
    RESET(FILEDIRECTORY,INDEXNAME);
    REPEAT
        SEEK(FILEDIRECTORY,I);
        GET(FILEDIRECTORY);
        IF NOT (FILEDIRECTORY^.UNUSED) THEN
            BEGIN
                DIRECTORY := FILEDIRECTORY^;
                DIRINFO[I].NOTUSED := FALSE;
                DIRINFO[I].TNAME := DIRECTORY.TESTNAME;
                DIRINFO[I].ITEMCOUNT := 0;
            END;
            I := I + 1;
        UNTIL I > MAXSUBTESTS;
    CLOSE(FILEDIRECTORY,NORMAL);
END; (* getdirinfo *)

(* ..... *)

(* clear screen and put cursor at 0,0 *)
PROCEDURE PAGE(DUMMY : CHAR);
BEGIN
    WRITE(CHR(28));
    GOTOXY(0,0);
END; (* page *)

(* ..... *)

(*$! /FILES/PMGR.DIR/P.UTL.TEXT *)      (* utilities *)
(*$! /FILES/PMGR.DIR/P.VIEW.TEXT *)     (* look at current configuration *)
(*$! /FILES/PMGR.DIR/P.SP.TEXT *)       (* set up test configuration *)
(*$! /FILES/PMGR.DIR/P.FBACK.TEXT *)    (* set up feedback/output *)

(* ..... *)

(* system set-up menu *)
PROCEDURE SETUPMENU;
VAR X,Y : INTEGER;
BEGIN
    PAGE(OUTPUT);
    GOTOXY(15,0);
    WRITE('CONFIGURE TEST PARAMETERS MENU ',VERSION);
    GOTOXY(0,4);
    WRITE('Select one of the following procedures by entering its number. ');
    X := 16;
    Y := 8;
    GOTOXY(X,Y);
    WRITE('1. QUIT');
    GOTOXY(X,Y+1);
    WRITE('2. LOOK AT CURRENT PARAMETERS');
    GOTOXY(X,Y+2);
    WRITE('3. MODIFY SYSTEM PARAMETERS');
    GOTOXY(X,Y+3);
    WRITE('4. CONFIGURE FEEDBACK PARAMETERS');
    GOTOXY(X,Y+7);
    WRITE('Enter Choice # : ');
END; (* setup menu *)

(* ..... *)

```

```

(* load the set-up parameters *)
PROCEDURE LOADPARAMS;
VAR I,J : INTEGER;
BEGIN
  RESET(FILESPARAMS,SETUPDATA);
  SEEK(FILESPARAMS,0);
  GET(FILESPARAMS);
  SPARAMS := FILESPARAMS^;
  CLOSE(FILESPARAMS,LOCK);
  J := 1;
  RESET(FILEDDIRECTORY,INDEXNAME);
  REPEAT
    I := SPARAMS.SUBORDER[J];
    IF (I <= MAXSUBTESTS) THEN
      BEGIN
        SEEK(FILEDDIRECTORY,I);
        GET(FILEDDIRECTORY);
        NAMEORDER[J] := FILEDDIRECTORY^.TESTNAME;
      END
    ELSE
      NAMEORDER[J] := '';
      J := J + 1;
  UNTIL J > GMAXSUBTEST;
  CLOSE(FILEDDIRECTORY,LOCK);
END; (* loadparams *)

(* ----- *)

(* save the set-up parameters *)
PROCEDURE SAVEPARAMS;
BEGIN
  RESET(FILESPARAMS,SETUPDATA);
  SEEK(FILESPARAMS,0);
  FILESPARAMS^ := SPARAMS;
  PUT(FILESPARAMS);
  CLOSE(FILESPARAMS,LOCK);
END; (* saveparams *)

(* ..... *)

(*** main program ***)
BEGIN
  GETDIRINFO;
  DIGITS := ('0'..'9');
  LETTERS := ('A'..'Z','a'..'z');
  CHARACTERS := (CHR(32)..CHR(126));
  FILLCHAR(LINEBUF(0),80,' ');
  LOADPARAMS;
  REPEAT
    SETUPMENU;
    COMMAND := GETCHAR(['1'..'4'],TRUE,FALSE,TRUE);
    CASE COMMAND OF
      '1' : ;
      '2' : VIEWPARAMS;
      '3' : SETPARAMETERS;
      '4' : SETFBACK;
    END;
  UNTIL COMMAND = '1';
  SAVEPARAMS;
  SETCHAIN('CATDATA;CATPROJECT');
END. (* P.MGR *)

```

```

(*-----*)
(*      Textfile : PMGR.DIR/P.UTL.TEXT      Volume : TFILES      *)
(*      Codefile : P.MGR.CODE                Volume : CATDATA     *)
(*-----*)
(*      DEC. 1, 1982                        NPROC                 *)
(*-----*)

(* This file contains the utilities used in program P.MGR. *)

(* form feeds the printer *)
PROCEDURE TOPOFFORM;
BEGIN
  REWRITE (DEST,UNITNUMPRINTER);
  WRITE (DEST,CHR(12));
  CLOSE (DEST,LOCK);
END;  (* top of form *)

(* -----*)

(*--- rings the bell ---*)
PROCEDURE SQUAWK;
BEGIN
  WRITE (CHR(BELL));
END;  (* squawk *)

(* -----*)

(*--- blank out lines ---*)
PROCEDURE BLANKLINES (START,COUNT,ENDCURSOR : INTEGER);
VAR I : INTEGER;
BEGIN
  GOTOXY(0,START);
  FOR I := 1 TO (COUNT-1) DO
    WRITELN(' ' : 39);
  WRITE (' ' : 39);
  GOTOXY(0,ENDCURSOR);
END;  (* blanklines *)

(* -----*)

(* read an acceptable character from the keyboard *)
FUNCTION GETCHAR (OKSET : SET OF CHAR;
                  FLUSHQUEUE,ECHO,BEEP : BOOLEAN) : CHAR;
VAR MASK : PACKED ARRAY[0..0] OF CHAR;
BEGIN
  IF FLUSHQUEUE THEN UNITCLEAR(2); (* flush buffer *)
  REPEAT
    UNITREAD(2,MASK,1);
    IF BEEP AND NOT (MASK[0] IN OKSET) THEN SQUAWK;

    UNTIL MASK[0] IN OKSET;
    IF ECHO AND (MASK[0] IN [CHR(32)..CHR(126)]) THEN
      WRITE (MASK[0]);
    GETCHAR := MASK[0];
  END;  (* getchar *)

(* -----*)

(*--- display a message/wait for a keystroke ---*)
PROCEDURE STALL;
VAR STALLCHAR : CHAR;
BEGIN
  WRITE('Press <RET> to continue ');
  STALLCHAR :=
    GETCHAR([CHR(RET),CHR(ESC)],TRUE,FALSE,TRUE);
  IF STALLCHAR = CHR(ESC) THEN EXIT(PROGRAM);
END;  (* stall *)

(* -----*)

```

```
(* read in a string and save in a temporary buffer *)
PROCEDURE FILLBUF(CHARCNT : INTEGER;
```

```
OKSET : SETOFCHAR; ERASE : BOOLEAN);
```

```
VAR I : INTEGER;
    IDCHAR : CHAR;
```

```
BEGIN
```

```
  I := 0;
```

```
  REPEAT
```

```
    IF I > (CHARCNT-1) THEN
```

```
      IDCHAR :=
```

```
        GETCHAR((CHR(LARROW),CHR(RET)),TRUE,TRUE,TRUE)
```

```
    ELSE
```

```
      BEGIN (1)
```

```
        IDCHAR :=
```

```
          GETCHAR(OKSET + [CHR(RET),
            CHR(LARROW),CHR(RARROW)],
            TRUE,TRUE,TRUE);
```

```
        IF IDCHAR IN OKSET THEN
```

```
          BEGIN (2)
```

```
            LINEBUF[I] := IDCHAR;
```

```
            I := I + 1;
```

```
          END; (2)
```

```
        END; (1)
```

```
        IF IDCHAR = CHR(LARROW) THEN
```

```
          BEGIN (3)
```

```
            IF I = 0 THEN
```

```
              SQUAWK
```

```
            ELSE
```

```
              BEGIN (4)
```

```
                WRITE(CHR(LARROW));
```

```
                I := I - 1;
```

```
                IF ERASE THEN
```

```
                  BEGIN (5)
```

```
                    WRITE(' ');
```

```
                    WRITE(CHR(LARROW));
```

```
                    LINEBUF[I] := ' ';
```

```
                  END; (5)
```

```
                END; (4)
```

```
            END; (3)
```

```
          ELSE
```

```
            IF IDCHAR = CHR(RARROW) THEN
```

```
              BEGIN (6)
```

```
                WRITE(LINEBUF[I]);
```

```
                I := I + 1;
```

```
              END; (6)
```

```
            UNTIL IDCHAR = CHR(RET);
```

```
          END; (* fillbuf *)
```

```
(* -----*)
```

```
(* open a new text file *)
```

```
PROCEDURE GETNEWFILE;
```

```
VAR FILENAME : STRING;
```

```
    ERRNUM : INTEGER;
```

```
(* ..... *)
```

```
(* get a legal filename *)
```

```
FUNCTION NAMEOK : BOOLEAN;
```

```
VAR I : INTEGER;
```

```
BEGIN
```

```
  IF FILENAME = '' THEN
```

```
    BEGIN (1)
```

```
      FILENAME := DEFAULTFILE;
```

```
      GOTOXY(44,0);
```

```
      WRITE(FILENAME);
```

```
    END (1)
```

```
  ELSE
```

```
    IF FILENAME[I] = CHR(esc) THEN EXIT(PROGRAM);
```

```
    IF (POS(' .TEXT',FILENAME) <> (LENGTH(FILENAME) - 4))
```

```
      OR (LENGTH(FILENAME) < 6) THEN
```

```
      FILENAME := CONCAT(FILENAME,'.TEXT');
```

```
(*!-*)
```

```

    RESET(DEST,FILENAME);
    (*$!+*)
    IF IORESULT = 0 THEN
    BEGIN (2)
        WRITELN;
        WRITELN;
        WRITE('Destroy old ',FILENAME,'? Press ''N'' or ''Y'' ');
        IF GETCHAR(['Y','n','Y','N'],TRUE,TRUE,TRUE) IN ['Y','y'] THEN
        BEGIN (3)
            CLOSE(DEST,PURGE);
            REWRITE(DEST,FILENAME);
            NAMEOK := TRUE;
        END (3)
        ELSE
            NAMEOK := FALSE;
    END (2)
    ELSE
    BEGIN (4)
        (*$!-*)
        REWRITE(DEST,FILENAME);
        (*$!+*)
        ERRNUM := IORESULT;
        IF IORESULT <> 0 THEN
        BEGIN (5)
            WRITELN;
            WRITELN;
            WRITELN('Cannot open ',FILENAME,' Io error #',ERRNUM);
            NAMEOK := FALSE;
        END (5)
        ELSE
            NAMEOK := TRUE;
    END (4)
    END; (* nameok *)

    (* ..... *)

    BEGIN (* getnewfile *)
        REPEAT
            PAGE(OUTPUT);
            WRITE('Enter output file name, then press <RET> ');
            READLN(FILENAME);
        UNTIL NAMEOK;
    END;

    (* ..... *)

    (* send control characters to screen *)
    PROCEDURE SCRCONTROL(I,J,K : INTEGER); { PASCAL interface to Screen Control}
    VAR N: INTEGER; { APPLE III Standard Device Drivers}
    G_ARRAY: PACKED ARRAY[0.. 3] OF 0..255; {..... Pages 34 to 46.}
    BEGIN
        G_ARRAY[0] := I; G_ARRAY[1] := J; G_ARRAY[2] := K;
        UNITWRITE(1,G_ARRAY,3,12);
    END; (* scrcontrol *)

    (* ..... *)

    (* switch to 40 column screen *)
    PROCEDURE TEXT40MODE;
    BEGIN
        SCRCONTROL(16,0,28); {Text mode 40BW, followed by clearscreen.}
    END; (* text40mode *)

    (* ..... *)

    (* switch to 80 column screen *)
    PROCEDURE TEXT80MODE;
    BEGIN
        SCRCONTROL(84,0,0); {Restore Viewport to its original condition.}
        SCRCONTROL(16,2,28); {Text Mode 80, followed by clearscreen.}
    END; (* text80mode *)

    (* ..... *)

```

```
(* turn on reverse video *)  
PROCEDURE INVERSE;  
BEGIN  
  SCRCONTROL (18,0,0);  
END;    (* inverse *)
```

```
(* -----*)
```

```
(* switch back to normal screen *)  
PROCEDURE NORMAL;  
BEGIN  
  SCRCONTROL (17,0,0);  
END;
```

```
(*****)
(*)
(*)      Textfile : PMGR.DIR/P.VIEW.TEXT      Volume : TFILES      (*)
(*)      Codefile : P.MGR.CODE ('Include' file) Volume : CATDATA    (*)
(*)
(*****)
(*) File last modified : Jan 28, 1983      NPRDC      (*)
(*****)
```

```
(* view the current configuration *)
PROCEDURE VIEWPARAMS;
CONST EMPTY = ';
```

```
VAR COUNT,
I : INTEGER;
SCREEN : BOOLEAN;
```

```
(* ..... *)
```

```
(* list out the tests *)
```

```
PROCEDURE LISTTESTS;
```

```
BEGIN
```

```
WRITE(DEST, 'TEST LENGTH STRATEGY ');
```

```
WRITE(DEST, 'CKERROR STOPFLAG');
```

```
FOR I := 1 TO MAXSUBTEST DO
```

```
BEGIN (1)
```

```
IF SPARAMS.SUBORDER[I] <= MAXSUBTESTS THEN
```

```
BEGIN (2)
```

```
WRITE(DEST, NAMEORDER[I] : 30);
```

```
WRITE(DEST, SPARAMS.SUBLENGTH[I] : 5);
```

```
CASE SPARAMS.SUBSTRAT[I] OF
```

```
0 : WRITE(DEST, 'None ');
```

```
1 : WRITE(DEST, 'B 102222 ');
```

```
2 : WRITE(DEST, 'B 54321 ');
```

```
3 : WRITE(DEST, 'B 108642 ');
```

```
4 : WRITE(DEST, 'Timed ');
```

```
END; (* cases *)
```

```
WRITE(DEST, SPARAMS.CKERROR[I] : 12 : 3);
```

```
IF SPARAMS.SUBSTOP[I] THEN
```

```
WRITE(DEST, 'Yes')
```

```
ELSE
```

```
WRITE(DEST, 'No');
```

```
WRITE(DEST);
```

```
END; (2)
```

```
END; (1)
```

```
END; (* listtests *)
```

```
(* ..... *)
```

```
(* list the feedback configuration *)
```

```
PROCEDURE LISTFBACK;
```

```
BEGIN
```

```
WRITE(DEST);
```

```
IF SPARAMS.ITEMOUTPUT = 0 THEN
```

```
WRITE(DEST, 'Item : none ');
```

```
ELSE
```

```
BEGIN (1)
```

```
WRITE(DEST, 'Item : ');
```

```
CASE SPARAMS.ITEMFB OF
```

```
1 : WRITE(DEST, 'right/wrong');
```

```
2 : WRITE(DEST, 'remedial');
```

```
END; (* cases *)
```

```
END; (1)
```

```
IF SPARAMS.SUBTESTOUTPUT = 0 THEN
```

```
WRITE(DEST, 'Subtest : none ');
```

```
ELSE
```

```
BEGIN (2)
```

```
WRITE(DEST, 'Subtest : ');
```

```
CASE SPARAMS.SUBTESTOUTPUT OF
```

```
1 : WRITE(DEST, 'screen ');
```

```
2 : WRITE(DEST, 'printer ');
```

```
3 : WRITE(DEST, 'screen & printer ');
```

```

        END; (* cases *)
    END; (2)
    IF SPARAMS.SESSIONOUTPUT = 0 THEN
        WRITE(DEST,'Session : none ')
    ELSE
        BEGIN (3)
            WRITE(DEST,'Session : ');
            CASE SPARAMS.SESSIONOUTPUT OF
                1 : WRITE(DEST,'screen');
                2 : WRITE(DEST,'printer');
                3,4,5 : WRITE(DEST,'screen & printer');
            END; (* cases *)
        END; (3)
        WRITELN(DEST);
    END; (* listback *)

    (* ..... *)

BEGIN (* view params *)

    (*
    PAGE(OUTPUT);
    WRITE('List configuration to : ');
    GOTOXY(15,5);
    WRITE('1) Console');
    GOTOXY(15,7);
    WRITE('2) Printer');
    GOTOXY(24,8);
    IF GETCHAR(['1','2'],TRUE,TRUE,TRUE) = '2' THEN
        BEGIN (1)
            REWRITE(DEST,UNITNUMPRINTER);
            SCREEN := FALSE;
        END (1)
    ELSE
        BEGIN (2)
            *)
            REWRITE(DEST,'CONSOLE:');
            SCREEN := TRUE;
        END; *)

    PAGE(OUTPUT);
    LISTTESTS;
    LISTFBACK;
    IF SCREEN THEN
        STALL;
        CLOSE(DEST,LOCK);
    END; (* view params *)

```

```

(*****)
(*)
(*)   Textfile : PMGR.DIR/P.SP.TEXT           Volume : TFILES      (*)
(*)   Codefile : P.MGR.CODE ('include' file) Volume : CATDATA      (*)
(*)
(*****)
(*) File last modified : Jan 28, 1983         NPRDC                (*)
(*****)

```

PROCEDURE SETPARAMETERS;

VAR COMMAND : CHAR;  
TEMP : SETUPINFO;

(\* ..... \*)

PROCEDURE SELECT20;

VAR I,  
J,  
K,  
LISTCNT,  
COUNT,  
CURSORLOC : INTEGER;  
COMMAND : CHAR;

OK,  
FOUND : BOOLEAN;  
LISTINFO : ARRAY(0..MAXSUBTESTS) OF RECORD  
NAME : STRING;  
INLIST : BOOLEAN;  
END;

FREE : ARRAY(1..GMAXSUBTEST) OF BOOLEAN;

(\* ..... \*)

(\* get list of available subtests & current ones \*)

PROCEDURE GETLIST;

BEGIN

I := 0;

J := 0;

REPEAT

IF NOT (DIRINFO[J].NOTUSED) THEN

BEGIN (1)

LISTINFO[I].NAME := DIRINFO[J].TNAME;

K := 1;

FOUND := FALSE;

REPEAT

IF NAMEORDER[K] = LISTINFO[I].NAME THEN

FOUND := TRUE;

K := K + 1;

UNTIL (FOUND) OR (K > GMAXSUBTEST);

IF FOUND THEN

LISTINFO[I].INLIST := TRUE

ELSE

LISTINFO[I].INLIST := FALSE;

I := I + 1;

END; (1)

J := J + 1;

UNTIL J > MAXSUBTESTS;

LISTCNT := I-1;

END; (\* getlist \*)

(\* ..... \*)

(\* add a subtest to the list \*)

PROCEDURE ADDSUBTEST;

VAR CONVERT : ARRAY(1..21) OF INTEGER;

ADD : INTEGER;

BEGIN

PAGE (OUTPUT);

IF COUNT < GMAXSUBTEST THEN

BEGIN (1)

```

K := 1;
FOR I := 0 TO LISTCNT DO
  IF NOT LISTINFO[I].INLIST THEN
    BEGIN (2)
      GOTOXY(18,K+1);
      WRITE(K,' ',LISTINFO[I].NAME);
      CONVERT[K] := I;
      K := K + 1;
    END; (2)
  IF K = 1 THEN
    BEGIN (3)
      WRITE(' ':18,'No tests available to add!');
      SQUAWK;
      WRITELN;
      WRITELN;
      STALL;
    END (3)
  ELSE
    BEGIN (4)
      OK := FALSE;
      REPEAT
        FILLCHAR(LINEBUF(0),' ',2);
        GOTOXY(0,0);
        WRITE(
          'Type in the number next to the test you wish to add and then press <RET>.' );
        GOTOXY(18,23);
        WRITE('Enter Choice # : ');
        FILLBUF(2,['0'..'9'],TRUE);
        IF LINEBUF(1) IN ['0'..'9'] THEN
          ADD := ((ORD(LINEBUF(0)) - 48) * 10)
            + (ORD(LINEBUF(1)) - 48)
        ELSE
          ADD := ORD(LINEBUF(0)) - 48;
        IF ADD = 0 THEN EXIT(ADDSUBTEST);
        IF (ADD < 0) OR (ADD > K) THEN
          SQUAWK
        ELSE
          BEGIN (5)
            OK := TRUE;
            LISTINFO[CONVERT[ADD]].INLIST := TRUE;
          END; (5)
        UNTIL OK;
      END; (4)
    END (1)
  ELSE
    BEGIN (6)
      SQUAWK;
      WRITE(' ':18,' Cannot add another test!');
      WRITELN;
      WRITELN;
      STALL;
    END; (6)
  END; (* addsubtest *)

  (* ----- *)

  (* normalize & fix the lists what we try to do is save the *)
  (* configuration of tests that were'nt removed. *)
  PROCEDURE ADJUSTLIST;
  BEGIN
    (* save the 'free' indices in the array of tests order *)
    (* and remove from 'inlist' the things already in the *)
    (* subtest order list, so we don't count them twice. *)

    FOR I := 1 TO GMAXSUBTEST DO
      BEGIN (1)
        FREE[I] := TRUE; (* initialize ith slot to unoccupied *)
        J := 0;
        FOUND := FALSE;

        (* see if ith subtest is in list *)

```

```

REPEAT
  IF (LISTINFO[J].INLIST) AND
    (LISTINFO[J].NAME = NAMEORDER[I]) THEN
    BEGIN (2)
      FOUND := TRUE;
      FREE[I] := FALSE; (* mark ith location as occupied *)
      LISTINFO[J].INLIST := FALSE; (* take out of list *)
    END; (2)
    J := J + 1;
  UNTIL (FOUND) OR (J > LISTCNT);
  IF NOT FOUND THEN
    NAMEORDER[I] := '';
END; (1)

(* put rest of inlist tests not already in subtest order array *)
(* into the array *)
FOR I := 0 TO LISTCNT DO
  BEGIN (3)
    IF LISTINFO[I].INLIST THEN
      BEGIN (4)
        J := 1;
        FOUND := FALSE;

        (* find unoccupied slot to put in *)
        REPEAT
          IF FREE[J] THEN
            BEGIN (5)
              FOUND := TRUE;
              FREE[J] := FALSE;
            END (5)
          ELSE
            J := J + 1;
        UNTIL (FOUND) OR (J > GMAXSUBTEST);

        (* no empty spots *)
        IF J > GMAXSUBTEST THEN
          BEGIN (6)
            PAGE(OUTPUT);
            WRITE('List formation error!');
            SQUAWK;
            WRITELN;
            WRITELN;
            STALL;
          END (6)
        ELSE
          NAMEORDER[J] := LISTINFO[I].NAME;
        END; (4)
      END; (3)

    I := I + 1;
  FOR J := 1 TO GMAXSUBTEST DO
    BEGIN (7)
      IF NAMEORDER[J] <> '' THEN
        BEGIN (8)
          TEMP.SUBSTRAT[I] := SPARAMS.SUBSTRAT[J];
          TEMP.SUBSTOP[I] := SPARAMS.SUBSTOP[J];
          TEMP.SUBLENGTH[I] := SPARAMS.SUBLENGTH[J];
          TEMP.CKERROR[I] := SPARAMS.CKERROR[J];
          TEMP.NAMEORDER[I] := NAMEORDER[J];
          TEMP.SUBORDER[I] := 1;
          I := I + 1;
        END; (8)
      END; (7)
    WHILE I <= GMAXSUBTEST DO
      BEGIN (9)
        TEMP.SUBORDER[I] := 128; (* mark as unused *)
        TEMP.NAMEORDER[I] := '';
        I := I + 1;
      END; (9)
    SPARAMS := TEMP;
    NAMEORDER := TEMP.NAMEORDER;
  END; (* adjust list *)

```

```
(* ..... *)

BEGIN (* select20 *)
  TEMP := SPARAMS;
  GETLIST;
  REPEAT
    CURSORLOC := 0;
    COUNT := 0;
    PAGE(OUTPUT);
    Writeln('      Tests Currently in List');
    FOR I := 1 TO 40 DO
      WRITE('-');
    Writeln;
    FOR I := 0 TO LISTCNT DO
      BEGIN (1)
        IF LISTINFO[I].INLIST THEN
          BEGIN (2)
            Writeln(' ',LISTINFO[I].NAME);
            COUNT := COUNT + 1;
          END; (2)
        END; (1)
      FOR I := 1 TO 40 DO
        WRITE('-');
      GOTOXY(50,2);
      WRITE('INSTRUCTIONS');
      GOTOXY(45,4);
      WRITE('To add a subtest to the list,');
      GOTOXY(45,5);
      WRITE('press the letter ''A''. You');
      GOTOXY(45,6);
      WRITE('may have up to 20 subtests. ');
      GOTOXY(45,8);
      WRITE('To remove a subtest from the');
      GOTOXY(45,9);
      WRITE('list, press <RET> until the');
      GOTOXY(45,10);
      WRITE('cursor is next to the subtest');
      GOTOXY(45,11);
      WRITE('you wish to remove, then press');
      GOTOXY(45,12);
      WRITE('the letter ''R''. ');
      GOTOXY(45,14);
      WRITE('Press ''Q'' to quit. ');
      GOTOXY(0,2);
      REPEAT
        COMMAND := GETCHAR(['A','R','Q',CHR(RET)] ,TRUE,FALSE,TRUE);
        CASE COMMAND OF
          'A' : ADDSUBTEST;
          'R' : BEGIN (3)
            I := -1;
            K := -1;
            REPEAT
              I := I + 1;
              IF LISTINFO[I].INLIST THEN
                K := K + 1;
            UNTIL K = CURSORLOC;
            LISTINFO[I].INLIST := FALSE;
          END; (3)
          'Q' : ;
        END; (* cases *)
      IF COMMAND = CHR(RET) THEN
        BEGIN (4)
          CURSORLOC := CURSORLOC + 1;
          IF CURSORLOC > (COUNT - 1) THEN
            BEGIN (5)
              GOTOXY(0,2);
              CURSORLOC := 0;
            END (5)
          ELSE
            GOTOXY(0,2 + CURSORLOC);
          END; (4)
        UNTIL COMMAND <> CHR(RET);
      UNTIL (COMMAND = 'Q') AND (COUNT <= GMAXSUBTEST);
```

```

ADJUSTLIST;
END; (* select 28 *)

(* ----- *)

(* display the subtest order *)
PROCEDURE ORDER;
TYPE VALIDTESTNUMBERS = 1..GMAXSUBTEST;
VAR I,
    J,
    K,
    NUM : INTEGER;
    NOTESTDUPLICATION,
    MATCH : BOOLEAN;
    BUCKET : SET OF VALIDTESTNUMBERS;
    CH : CHAR;

    (* ..... *)

    (* display current order *)
    PROCEDURE SHOWTESTS;
    BEGIN
        PAGE(OUTPUT);
        K := 0;
        GOTOXY(50,3);
        WRITE('Current Order');
        FOR I := 1 TO GMAXSUBTEST DO
            BEGIN (1)
                IF SPARAMS.SUBORDER[I] <= MAXSUBTESTS THEN
                    BEGIN (2)
                        GOTOXY(40,I+3);
                        K := K + 1;
                        WRITE(' ':2,CHR(I+64),'. ');
                        WRITE(' ',NAMEORDER[I]);
                    END (2)
                END; (1)
            END; (* showtests *)

    (* ..... *)

    BEGIN
        TEMP := SPARAMS;
        SHOWTESTS;
        GOTOXY(0,0);
        WRITELN(
            'Type the letter next to the subtest you wish to put in the new order. ');
        WRITELN('Or press <ret> to keep the same subtest in order. ');
        IF K > 0 THEN
            BEGIN (1)
                BUCKET := [];
                GOTOXY(15,3);
                WRITE('New Order');
                FOR I := 1 TO K DO
                    BEGIN (2)
                        NO_TEST_DUPLICATION := FALSE;
                        REPEAT
                            GOTOXY(2,I+3);
                            WRITE(I,' ');
                            CH := GETCHAR(['A'..CHR(K+64),CHR(13)],TRUE,FALSE,
                                TRUE);
                            IF CH <> CHR(13) THEN
                                NUM := ORD(CH) - 64
                            ELSE
                                IF CH = CHR(13) THEN
                                    BEGIN (3)
                                        NUM := I;
                                        SPARAMS.SUBORDER[I] := NUM;
                                        GOTOXY(40,I+3);
                                        WRITE(' ':39);
                                        GOTOXY(6,I+3);
                                        WRITE(' ':32);
                                        GOTOXY(6,I+3);
                                        WRITELN(NAMEORDER(NUM));
                                    END (3)
                                END;
                            UNTIL NO_TEST_DUPLICATION;
                        END;
                    END;
                END;
            END;
        END;
    END;

```

```

END; (3)
IF NUM IN BUCKET THEN
BEGIN (4)
  GOTOXY(6,1+3);
  WRITELN('test duplication      ');
  SQUAWK;
END (4)
ELSE
BEGIN (5)
  BUCKET := BUCKET + [NUM];
  NO_TEST_DUPLICATION := TRUE;
  GOTOXY(40,NUM+3);
  WRITE(' ':39);
  GOTOXY(6,1+3);
  WRITE(' ':32);
  GOTOXY(6,1+3);
  WRITELN(NAMEORDER(NUM));
  SPARAMS.SUBORDER[I] := NUM;
END; (5)
UNTIL NO_TEST_DUPLICATION;
END; (2)
FOR I := 1 TO K DO
BEGIN (6)
  J := SPARAMS.SUBORDER[I];
  TEMP.SUBSTRAT[I] := SPARAMS.SUBSTRAT[J];
  TEMP.SUBSTOP[I] := SPARAMS.SUBSTOP[J];
  TEMP.SUBLENGTH[I] := SPARAMS.SUBLENGTH[J];
  TEMP.CKERROR[I] := SPARAMS.CKERROR[J];
  TEMP.NAMEORDER[I] := NAMEORDER[J];
  TEMP.SUBORDER[I] := I;
END; (6)
FOR I := (K+1) TO GMAXSUBTEST DO
  TEMP.SUBORDER[I] := 128; (* mark as unused *)
SPARAMS := TEMP;
NAMEORDER := TEMPNAMEORDER;
END; (1)
END; (* order *)

(* ----- *)

(* set up subtest strategy *)
PROCEDURE STRATEGY;
VAR I,
    K : INTEGER;
    CH : CHAR;
    DONE : BOOLEAN;
BEGIN
  PAGE(OUTPUT);
  WRITELN('Beginning at the top of the list, type <return> to keep old strategy');
  WRITELN('or type the number of the strategy you want. Type "Q" to quit.');
```

	Subtests	Strategy	Available Strategies'
GOTOXY(56,5);			
WRITE('0. NONE');			
GOTOXY(56,6);			
WRITE('1. B 10.2.2.2.2');			
GOTOXY(56,7);			
WRITE('2. B 5.4.3.2.1');			
GOTOXY(56,8);			
WRITE('3. B 10.8.6.4.2');			
GOTOXY(56,9);			
WRITE('4. TIMED');			

```

  K := 0;
  FOR I := 1 TO GMAXSUBTEST DO
  BEGIN (1)
    IF SPARAMS.SUBORDER[I] <= MAXSUBTESTS THEN
    BEGIN (2)
      GOTOXY(0,1+3);
      WRITE(NAMEORDER[I] : 30);
      GOTOXY(31,1+3);
      WRITE(' ',SPARAMS.SUBSTRAT[I],'. ');
      CASE SPARAMS.SUBSTRAT[I] OF

```

```

      0 : WRITE('None ');
      1 : WRITE('B 102222');
      2 : WRITE('B 54321 ');
      3 : WRITE('B 108642');
      4 : WRITE('Timed ');
    END; (* cases *)
    K := K + 1;
  END; (2)
END; (1)
I := 1;
DONE := FALSE;
WHILE (K > 0) AND (NOT DONE) DO
  BEGIN (3)
    GOTOXY(34,1+3);
    CH:=GETCHAR(['0'..'4',CHR(13),'Q'],TRUE,FALSE,TRUE);
    IF CH = 'Q' THEN DONE := TRUE;
    IF CH IN ['0'..'4'] THEN
      BEGIN (4)
        SPARAMS.SUBSTRAT[I] := ORD(CH) - 48;
        GOTOXY(34,1+3);
        WRITE(ORD(CH)-48,' ');
        CASE CH OF
          '0' : WRITE('None ');
          '1' : WRITE('B 102222');
          '2' : WRITE('B 54321 ');
          '3' : WRITE('B 108642');
          '4' : WRITE('Timed ');
        END; (* cases *)
      END; (4)
      I := I + 1;
      IF I > K THEN
        I := 1;
      END; (3)
    END; (* strategy *)

    (* ----- *)

    (* set the subtest stop flags *)
    PROCEDURE STOP;
    VAR I,
        TCNT : INTEGER;
        CH : CHAR;
        DONE : BOOLEAN;
    BEGIN
      PAGE(OUTPUT);
      WRITELN('Beginning at the top of the list, press <return> to keep old value');
      WRITELN('or press ''Y'' or ''N''. Press ''Q'' to quit. ');
      GOTOXY(24,3);
      WRITE('Subtests                               Stop');
      TCNT := 0;
      FOR I := 1 TO GMAXSUBTEST DO
        BEGIN (1)
          IF SPARAMS.SUBORDER[I] <= MAXSUBTESTS THEN
            BEGIN (2)
              GOTOXY(6,1+3);
              WRITE(NAMEORDER[I] : 30);
              GOTOXY(54,1+3);
              IF SPARAMS.SUBSTOP[I] THEN
                WRITE('Y')
              ELSE
                WRITE('N');
              TCNT := TCNT + 1;
            END; (2)
          END; (1)
        DONE := FALSE;
        I := 1;
        WHILE (TCNT > 0) AND (NOT DONE) DO
          BEGIN (3)
            GOTOXY(54,1+3);
            CH := GETCHAR(['Q','N','Y',CHR(13)],TRUE, (* ADD y AND n HERE *)
              TRUE,TRUE);
            IF CH = 'Y' THEN
              SPARAMS.SUBSTOP[I] := TRUE
          END; (3)
        END; (3)
      END; (3)
    END;
  END;

```

```

ELSE
  IF CH = 'N' THEN
    SPARAMS.SUBSTOP[I] := FALSE
  ELSE
    IF CH = 'Q' THEN
      DONE := TRUE;
    I := I + 1;
    IF I > TCNT THEN
      I := 1;
    END; (3)
  END; (* stop *)

  (* ----- *)

  (* set up # of questions/subtest *)
  PROCEDURE MAXQUESTIONS;
  VAR I,
      TCNT : INTEGER;
      CH : CHAR;
      CHVALUE : PACKED ARRAY[0..1] OF CHAR;
      DONE,
      OK : BOOLEAN;

  (* ..... *)

  (* read in a string and save in a temporary buffer *)
  PROCEDURE MAXFILLBUF(CHARCNT : INTEGER;
                      OKSET : SET OF CHAR; ERASE : BOOLEAN);
  VAR I : INTEGER;
      IDCHAR : CHAR;
  BEGIN
    I := 1;
    REPEAT
      IF I > (CHARCNT-1) THEN
        IDCHAR :=
          GETCHAR([CHR(LARROW), CHR(RET)], TRUE, TRUE, TRUE)
      ELSE
        BEGIN (1)
          IDCHAR :=
            GETCHAR(OKSET + [CHR(RET),
                           CHR(LARROW), CHR(RARROW)],
                   TRUE, TRUE, TRUE);
          IF IDCHAR IN OKSET THEN
            BEGIN (2)
              LINEBUF[I] := IDCHAR;
              I := I + 1;
            END; (2)
          END; (1)
          IF IDCHAR = CHR(LARROW) THEN
            BEGIN (3)
              IF I = 0 THEN
                SQUAWK
              ELSE
                BEGIN (4)
                  WRITE(CHR(LARROW));
                  I := I - 1;
                  IF ERASE THEN
                    BEGIN (5)
                      WRITE(' ');
                      WRITE(CHR(LARROW));
                      LINEBUF[I] := ' ';
                    END; (5)
                END; (4)
              END; (3)
            ELSE
              IF IDCHAR = CHR(RARROW) THEN
                BEGIN (6)
                  WRITE(LINEBUF[I]);
                  I := I + 1;
                END; (6)
            UNTIL IDCHAR = CHR(RET);
          END; (* maxfillbuf *)

```

(\* ..... \*)

BEGIN (\* maxquestions \*)

PAGE (OUTPUT);

WRITELN('From top of list, press <RET> to keep old value. To change length,');  
WRITELN('type the new value you want, then press <RET>. Press 'Q' to quit.');

GOTOXY(24,3);

WRITELN('Subtests # of questions');

TCNT := 0;

FOR I := 1 TO GMAXSUBTEST DO

BEGIN {1}

IF SPARAMS.SUBORDER[I] <= MAXSUBTESTS THEN

BEGIN {2}

GOTOXY(6,I+3);

WRITE(NAMEORDER[I] : 30);

GOTOXY(55,I+3);

WRITE(SPARAMS.SUBLENGTH[I]);

TCNT := TCNT + 1;

END; {2}

END; {1}

I := I + 1;

DONE := FALSE;

WHILE (TCNT > 0) AND (NOT DONE) DO

BEGIN {3}

GOTOXY(55,I+3);

CH := GETCHAR(['Q',CHR(13)] + ['0'..'9'],TRUE,  
TRUE,TRUE);

IF CH = 'Q' THEN

DONE := TRUE

ELSE

IF CH <> CHR(13) THEN

BEGIN {4}

OK := FALSE;

REPEAT

FILLCHAR(LINEBUF[0],2,' ');

LINEBUF[0] := CH;

GOTOXY(55,I+3);

WRITE(' ');

GOTOXY(55,I+3);

WRITE(CH);

MAXFILLBUF(2,['0'..'9'],TRUE);

MOVELEFT(LINEBUF[0],CHVALUE[0],2);

IF CHVALUE = ' ' THEN

SQUAWK

ELSE

BEGIN {5}

IF LINEBUF[1] = ' ' THEN

SPARAMS.SUBLENGTH[I] := ORD(LINEBUF[0]) - 48

ELSE

SPARAMS.SUBLENGTH[I] := ((ORD(LINEBUF[0]) - 48) \* 10)  
+ (ORD(LINEBUF[1]) - 48);

END; {5}

IF (SPARAMS.SUBLENGTH[I] <= 0) OR (SPARAMS.SUBLENGTH[I] > 20)

THEN

SQUAWK

ELSE

OK := TRUE;

UNTIL OK;

END; {4}

I := I + 1;

IF I > TCNT THEN

I := 1;

END; {3}

END; (\* maxquestions \*)

(\* ..... \*)

(\* set ckerror value \*)

PROCEDURE CHECKERROR;

VAR I,

TCNT,

K : INTEGER;

CH : CHAR;

```

    DONE,
    OK : BOOLEAN;
    CHVALUE : PACKED ARRAY(0..3) OF CHAR;
BEGIN
    PAGE(OUTPUT);
    WRITELN('Beginning at the top of the list, type <return> to keep the old');
    WRITELN('value or type in the value you want. Type "Q" to quit.');
```

GOTOXY(24,3);

WRITE('Subtests                      Check error value');

TCNT := 0;

FOR I := 1 TO GMAXSUBTEST DO

BEGIN {1}

IF SPARAMS.SUBORDER[I] <= MAXSUBTESTS THEN

BEGIN {2}

GOTOXY(6,I+3);

WRITE(NAMEORDER[I] : 30);

GOTOXY(54,I+3);

WRITE(SPARAMS.CKERROR[I] : 5 : 3);

TCNT := TCNT + 1;

END; {2}

END; {1}

I := I + 1;

DONE := FALSE;

WHILE (TCNT > 0) AND (NOT DONE) DO

BEGIN {3}

OK := FALSE;

REPEAT

GOTOXY(55,I+3);

CH := GETCHAR(['Q','0'..'9',CHR(13)],

                    TRUE,TRUE,TRUE);

IF CH = 'Q' THEN

DONE := TRUE

ELSE

IF CH <> CHR(13) THEN

BEGIN {4}

GOTOXY(56,I+3);

WRITE('    ');

CHVALUE[0] := CH;

GOTOXY(57,I+3);

K := 0;

REPEAT

K := K + 1;

CH := GETCHAR(['0'..'9',CHR(27)],TRUE,TRUE,TRUE);

CHVALUE[K] := CH;

UNTIL (K = 3) OR (CH = CHR(27));

IF CH <> CHR(27) THEN

OK := TRUE

ELSE

BEGIN {5}

GOTOXY(55,I+3);

WRITE(SPARAMS.CKERROR[I] : 5 : 3);

END; {5}

IF OK THEN

SPARAMS.CKERROR[I] :=

(ORD(CHVALUE[0]) - 48) +

((ORD(CHVALUE[1]) - 48) \* 0.1) +

((ORD(CHVALUE[2]) - 48) \* 0.01) +

((ORD(CHVALUE[3]) - 48) \* 0.001);

END; {4}

UNTIL (DONE) OR (OK) OR (CH = CHR(13));

I := I + 1;

IF I > TCNT THEN

I := 1;

END; {3}

END; (\* check error \*)

(\* ----- \*)

(\* parameter setup menu \*)

PROCEDURE PARAMMENU;

VAR X,Y : INTEGER;

BEGIN

PAGE(OUTPUT);

```

GOTOXY(19,0);
WRITE('MODIFY PARAMETERS MENU');
GOTOXY(0,4);
WRITE('Select one of the following procedures by entering its number. ');
X := 16;
Y := 8;
GOTOXY(X,Y);
WRITE('1. QUIT');
GOTOXY(X,Y+1);
WRITE('2. MODIFY LIST OF SUBTESTS TO GIVE');
GOTOXY(X,Y+2);
WRITE('3. ORDER THE SUBTESTS');
GOTOXY(X,Y+3);
WRITE('4. CONFIGURE SUBTEST LENGTH');
GOTOXY(X,Y+4);
WRITE('5. CONFIGURE SUBTEST STRATEGY');
GOTOXY(X,Y+5);
WRITE('6. CONFIGURE VARIANCE CUT-OFF');
GOTOXY(X,Y+6);
WRITE('7. CONFIGURE SUBTEST STOP FLAG');
GOTOXY(X,Y+10);
WRITE('Enter Choice # : ');
END; (* parammenu *)

(* ----- *)

(* stores in the spams.suborder array, the record numbers of the *)
(* subtest directories so we won't have to search the test *)
(* directory later to find the subtest directory we want. *)
PROCEDURE SETSUBTESTRECNUMS;
VAR K,
    RECNUM : INTEGER; (* # of key errors in samples questions *)
    FOUND : BOOLEAN;
BEGIN
    FOR K := 1 TO MAXSUBTEST DO
        BEGIN (1)
            IF SPAMS.SUBORDER[K] <= MAXSUBTESTS THEN
                BEGIN (2)
                    RECNUM := 0;
                    (* search through test directory sequentially *)
                    FOUND := FALSE;
                    REPEAT
                        IF (NOT (DIRINFO(RECNUM).NOTUSED))
                            AND (DIRINFO(RECNUM).TNAME = NAMEORDER[K]) THEN
                            FOUND := TRUE
                        ELSE
                            RECNUM := RECNUM + 1;
                    UNTIL (FOUND) OR (RECNUM > MAXSUBTESTS);

                    IF FOUND THEN
                        SPAMS.SUBORDER[K] := RECNUM
                    ELSE
                        BEGIN (3)
                            PAGE(OUTPUT);
                            WRITELN('Subtest configuration error !');
                            WRITELN('Test ',NAMEORDER[K], ' in list, but not in directory !');
                            SQUAWK;
                            WRITELN;
                            STALL;
                        END; (3)
                    END; (2)
                END; (1)
            END; (* setsubtestrecnums *)
        END;

(* ..... *)

BEGIN (* Set parameters *)
    REPEAT
        PARAMMENU;
        COMMAND := GETCHAR(['1'..'7'],TRUE,FALSE,TRUE);
        CASE COMMAND OF
            '1' : ;
            '2' : SELECT20;

```

```
'3' : ORDER;  
'4' : MAXQUESTIONS;  
'5' : STRATEGY;  
'6' : CHECKERROR;  
'7' : STOP;  
END;  
UNTIL COMMAND = '1';  
SETSUBTESTRECNUMS;  
END;      (* set parameters *)
```

```

(*)
(*)
(*)      Textfile : PMGR.DIR/P.FBACK.TEXT      Volume : TFILES      (*)
(*)      Codefile : P.MGR.CODE ('Include' file) Volume : CATDATA      (*)
(*)
(*)-----(*)
(*)      DEC.  1, 1982      NPROC      (*)
(*)-----(*)

```

```

(*) configure feedback *)
PROCEDURE SETFBACK;
VAR COMMAND,
    CH : CHAR;

```

```

(*) ..... *)

```

```

(*) feedback configure menu *)

```

```

PROCEDURE FMENU;
VAR X,Y : INTEGER;
BEGIN
    PAGE(OUTPUT);
    GOTOXY(18,0);
    WRITE('CONFIGURE FEEDBACK MENU');
    GOTOXY(0,4);
    WRITE('Select one of the following procedures by entering its number. ');
    X := 18;
    Y := 8;
    GOTOXY(X,Y);
    WRITE('1.  QUIT');
    GOTOXY(X,Y+1);
    WRITE('2.  CONFIGURE QUESTION FEEDBACK');
    GOTOXY(X,Y+2);
    WRITE('3.  CONFIGURE SUBTEST FEEDBACK');
    GOTOXY(X,Y+3);
    WRITE('4.  CONFIGURE SESSION FEEDBACK');
    GOTOXY(X,Y+7);
    WRITE('Enter Choice # : ');
END;  (* fmenu *)

```

```

(*) ----- *)

```

```

(*) configure item feedback/output *)

```

```

PROCEDURE ITEM;
VAR X,Y,OPT : INTEGER;
    CHAROPT : CHAR;
BEGIN
    PAGE(OUTPUT);
    GOTOXY(18,0);
    WRITE('QUESTION FEEDBACK MENU');
    GOTOXY(0,4);
    WRITE('Select one of the following options by entering its number. ');
    X := 16;
    Y := 9;
    GOTOXY(X,Y);
    WRITE('1.  QUIT');
    GOTOXY(X,Y+1);
    WRITE('2.  NO QUESTION FEEDBACK');
    GOTOXY(X,Y+2);
    WRITE('3.  RIGHT/WRONG QUESTION FEEDBACK');
    GOTOXY(X,Y+3);
    WRITE('4.  REMEDIAL QUESTION FEEDBACK');
    REPEAT
        GOTOXY(0,6);
        WRITE('You currently have option : ');
        IF SPARAMS.ITEMOUTPUT = 0 THEN
            OPT := 2
        ELSE
            IF SPARAMS.ITEMFB = 1 THEN
                OPT := 3
            ELSE
                OPT := 4;
        WRITE(OPT);
    UNTIL OPT < 1 OR OPT > 4;

```

```

INVERSE;
CASE OPT OF
  2 : BEGIN
    GOTOXY(X,Y+1);
    WRITE('2. NO QUESTION FEEDBACK');
  END;
  3 : BEGIN
    GOTOXY(X,Y+2);
    WRITE('3. RIGHT/WRONG QUESTION FEEDBACK');
  END;
  4 : BEGIN
    GOTOXY(X,Y+3);
    WRITE('4. REMEDIAL QUESTION FEEDBACK');
  END;
END; (* cases *)
NORMAL;
GOTOXY(X,Y+7);
WRITE(' ');
GOTOXY(X,Y+7);
WRITE('Enter Choice # : ');
CHAROPT := GETCHAR(['1'..'4'],TRUE,TRUE,TRUE);
CASE CHAROPT OF
  '2' : SPARAMS.ITEMOUTPUT := 0;
  '3' : BEGIN
    SPARAMS.ITEMOUTPUT := 1;
    SPARAMS.ITEMFB := 1;
  END;
  '4' : BEGIN
    SPARAMS.ITEMOUTPUT := 1;
    SPARAMS.ITEMFB := 2;
  END;
END; (* cases *)

CASE OPT OF
  2 : BEGIN
    GOTOXY(X,Y+1);
    WRITE('2. NO QUESTION FEEDBACK');
  END;
  3 : BEGIN
    GOTOXY(X,Y+2);
    WRITE('3. RIGHT/WRONG QUESTION FEEDBACK');
  END;
  4 : BEGIN
    GOTOXY(X,Y+3);
    WRITE('4. REMEDIAL QUESTION FEEDBACK');
  END;
END; (* cases *)
UNTIL CHAROPT = '1';
END; (* item *)

(* ----- *)

(* configure subtest feedback/output *)
PROCEDURE SUBTEST;
VAR X,Y,OPT : INTEGER;
    CHAROPT : CHAR;
BEGIN
  PAGE(OUTPUT);
  GOTOXY(18,0);
  WRITE('SUBTEST FEEDBACK MENU');
  GOTOXY(0,4);
  WRITE('Select one of the following options by entering its number. ');
  X := 16;
  Y := 9;
  GOTOXY(X,Y);
  WRITE('1. QUIT');
  GOTOXY(X,Y+1);
  WRITE('2. NO SUBTEST FEEDBACK');
  GOTOXY(X,Y+2);
  WRITE('3. SUBTEST FEEDBACK TO SCREEN');
  GOTOXY(X,Y+3);
  WRITE('4. SUBTEST FEEDBACK TO PRINTER');

```

```

GOTOXY(X,Y+4);
WRITE('5. SUBTEST FEEDBACK TO SCREEN AND PRINTER');
REPEAT
  GOTOXY(0,6);
  WRITE('You currently have option : ');
  IF SPARAMS.SUBTESTOUTPUT = 0 THEN
    OPT := 2
  ELSE
    IF SPARAMS.SUBTESTOUTPUT = 1 THEN
      OPT := 3
    ELSE
      IF SPARAMS.SUBTESTOUTPUT = 2 THEN
        OPT := 4
      ELSE
        OPT := 5;
      WRITE(OPT);
    END;
  END;
  INVERSE;
  CASE OPT OF
    2 : BEGIN
      GOTOXY(X,Y+1);
      WRITE('2. NO SUBTEST FEEDBACK');
    END;
    3 : BEGIN
      GOTOXY(X,Y+2);
      WRITE('3. SUBTEST FEEDBACK TO SCREEN');
    END;
    4 : BEGIN
      GOTOXY(X,Y+3);
      WRITE('4. SUBTEST FEEDBACK TO PRINTER');
    END;
    5 : BEGIN
      GOTOXY(X,Y+4);
      WRITE('5. SUBTEST FEEDBACK TO SCREEN AND PRINTER');
    END;
  END; (* cases *)
  NORMAL;

  GOTOXY(X,Y+8);
  WRITE(' ');
  GOTOXY(X,Y+8);
  WRITE('Enter Choice # : ');
  CHAROPT := GETCHAR(['1'..'5'], TRUE, TRUE, TRUE);
  CASE CHAROPT OF
    '2' : SPARAMS.SUBTESTOUTPUT := 0;
    '3' : SPARAMS.SUBTESTOUTPUT := 1;
    '4' : SPARAMS.SUBTESTOUTPUT := 2;
    '5' : SPARAMS.SUBTESTOUTPUT := 3;
  END; (* cases *)

  CASE OPT OF
    2 : BEGIN
      GOTOXY(X,Y+1);
      WRITE('2. NO SUBTEST FEEDBACK');
    END;
    3 : BEGIN
      GOTOXY(X,Y+2);
      WRITE('3. SUBTEST FEEDBACK TO SCREEN');
    END;
    4 : BEGIN
      GOTOXY(X,Y+3);
      WRITE('4. SUBTEST FEEDBACK TO PRINTER');
    END;
    5 : BEGIN
      GOTOXY(X,Y+4);
      WRITE('5. SUBTEST FEEDBACK TO SCREEN AND PRINTER');
    END;
  END; (* cases *)
  UNTIL CHAROPT = '1';
END; (* subtest *)

(* ----- *)

```

```

(* configure session feedback/output *)
PROCEDURE SESSION;
VAR X,Y,OPT : INTEGER;
    CHAROPT : CHAR;
BEGIN
    PAGE(OUTPUT);
    GOTOXY(18,0);
    WRITE('SESSION FEEDBACK MENU');
    GOTOXY(0,4);
    WRITE('Select one of the following options by entering its number. ');
    X := 16;
    Y := 9;
    GOTOXY(X,Y);
    WRITE('1. QUIT');
    GOTOXY(X,Y+1);
    WRITE('2. NO SESSION FEEDBACK');
    GOTOXY(X,Y+2);
    WRITE('3. SESSION FEEDBACK TO SCREEN');
    GOTOXY(X,Y+3);
    WRITE('4. SESSION FEEDBACK TO PRINTER');
    GOTOXY(X,Y+4);
    WRITE('5. SESSION FEEDBACK TO SCREEN AND PRINTER');
    REPEAT
        GOTOXY(0,6);
        WRITE('You currently have option : ');
        IF SPARAMS.SESSIONOUTPUT = 0 THEN
            OPT := 2
        ELSE
            IF SPARAMS.SESSIONOUTPUT = 1 THEN
                OPT := 3
            ELSE
                IF SPARAMS.SESSIONOUTPUT = 2 THEN
                    OPT := 4
                ELSE
                    OPT := 5;
            END;
        END;
        WRITE(OPT);

        INVERSE;
        CASE OPT OF
            2 : BEGIN
                GOTOXY(X,Y+1);
                WRITE('2. NO SESSION FEEDBACK');
            END;
            3 : BEGIN
                GOTOXY(X,Y+2);
                WRITE('3. SESSION FEEDBACK TO SCREEN');
            END;
            4 : BEGIN
                GOTOXY(X,Y+3);
                WRITE('4. SESSION FEEDBACK TO PRINTER');
            END;
            5 : BEGIN
                GOTOXY(X,Y+4);
                WRITE('5. SESSION FEEDBACK TO SCREEN AND PRINTER');
            END;
        END; (* cases *)
        NORMAL;

        GOTOXY(X,Y+8);
        WRITE(' ');
        GOTOXY(X,Y+8);
        WRITE('Enter Choice # : ');
        CHAROPT := GETCHAR(['1'..'5'], TRUE, TRUE, TRUE);
        CASE CHAROPT OF
            '2' : SPARAMS.SESSIONOUTPUT := 0;
            '3' : SPARAMS.SESSIONOUTPUT := 1;
            '4' : SPARAMS.SESSIONOUTPUT := 2;
            '5' : SPARAMS.SESSIONOUTPUT := 3;
        END; (* cases *)

        CASE OPT OF
            2 : BEGIN
                GOTOXY(X,Y+1);

```

```

        WRITE('2. NO SESSION FEEDBACK');
    END;
3 : BEGIN
    GOTOXY(X,Y+2);
    WRITE('3. SESSION FEEDBACK TO SCREEN');
    END;
4 : BEGIN
    GOTOXY(X,Y+3);
    WRITE('4. SESSION FEEDBACK TO PRINTER');
    END;
5 : BEGIN
    GOTOXY(X,Y+4);
    WRITE('5. SESSION FEEDBACK TO SCREEN AND PRINTER');
    END;
END; (* cases *)
UNTIL CHAROPT = '1';
END; (* session *)

(* ..... *)

BEGIN (* setback *)
    REPEAT
        FMENU;
        COMMAND := GETCHAR(['1'..'4'],TRUE,FALSE,TRUE);
        CASE COMMAND OF
            '1' : ;
            '2' : ITEM;
            '3' : SUBTEST;
            '4' : SESSION;
        END; (* cases *)
    UNTIL COMMAND = '1';
END; (* setback *)

```

**TMGR.DIR:**  
**Subdirectory - Test Manager Textfiles**



```
(**S**)
(*****)
(*)
(*)      Textfile : TMGR.DIR/T.MGR.TEXT      Volume : TFILES      (*)
(*)      Codefile : T.MGR.CODE                Volume : CATDATA    (*)
(*)
(*****)
(*) File last modified : Feb 28, 1983      NPRDC (*)
(*****)
(*)
(*) Functions : 1) provides file maintenance of tests. (*)
(*)              2) allows creation of new tests. (*)
(*)              3) access to existing tests for insertion, modification, or (*)
(*)                  deletion of test questions. (*)
(*)              4) lists tests to file, console, or printer for verification. (*)
(*)              5) writes subtests from Corvus to five inch floppy. (*)
(*)
(*****)
(*)
(*) 1. Slot 0 of subtest directory reserved for subtest instructions. (*)
(*)
(*) 2. Slots 1..5 of subtest directory reserved for subtest samples. (*)
(*)
(*) 3. Variant type of answers stored. May store item answer as character, (*)
(*)     integer, or packed array of 7 characters. This handles the different (*)
(*)     types of subtests. (*)
(*)
(*) 4. First character of subtest name specifies type of screen format. (*)
(*)     * = 80 char/inverse, @ = 80 char/normal, ? = 40 char/normal. If none (*)
(*)     of these characters occur, then the screen defaults to 40 char/inverse. (*)
(*)
(*) 5. If test is a timed test, the second character of the subtest name, (*)
(*)     will be a digit and specify the maximum time in minutes, allowed for (*)
(*)     that subtest. (*)
(*)
(*) 6. Graphics feature added, if graphics flag is set the program will look (*)
(*)     for a graphics file to display, else it looks in the normal ascii file. (*)
(*)
(*) 7. Text output routine improved. Text format slightly changed. After (*)
(*)     gotoflag and x and y coordinates, the number of bytes for that line is (*)
(*)     saved. Text output consists of mass movement of bytes into line (*)
(*)     buffer, then writing the buffer to the screen for each line. (*)
(*)
(*) 8. Timed subtests now can be set to minutes and seconds. Two more (*)
(*)     characters in subtest name used for seconds. (*)
(*)
(*) 9. Will display compressed graphics files as well as normal fotofiles. (*)
(*)
(*****)
```

```
PROGRAM TESTMGR;
USES PGRAF,
    CHAINSTUFF;
```

```
CONST (* ascii values *)
    ETX = 3;      (* control-c *)
    BELL = 7;
    NUL = 0;
    LARROW = 8;
    RARROW = 21;
    RET = 13;
    UP = 11;      (* up arrow *)
    DOWN = 10;    (* down arrow *)
    ESC = 27;
    SPACE = 32;
    PAGEOUT = 16; (* cntrl-p on apple ii *)
    ASCIIOFFSET = 48; (* ascii zero *)
    NIL = -1;

    XSCREEN = 79; (* screen dimensions *)
    YSCREEN = 23;

    (* block sized buffer for ascii *)
```

```

MAXITEMBUF = 2847;

MAXLINEBUF = 79;  (* string buffer size *)

(* screen boundaries for question text *)
(* lines 0 - 3, 20 - 23 reserved for *)
(* system messages. *)
TOPMAX = 0;
LEFTMAX = 0;
BOTTOMMAX = 19;

(* question textfile control codes *)
GOTOFLAG = 128;  (* flags a gotoxy *)
PAGEFLAG = 129;  (* flags text continues on another page *)
UNUSEDFLAG = 130; (* flags unused byte *)
ENDITEM = 131;  (* flags end of text for a question *)

(* these files must reside on disk ! *)
DATANAME = 'CATDATA:ITEMPOOL.DATA';  (* question data *)
TEXTNAME = 'QTEXT:ITEMTEXT.DATA';  (* question text *)
INDEXNAME = 'CATDATA:TESTINDEX.DATA'; (* test directory *)

(* output file for listing test questions *)
DEFAULTFILE = 'CATDATA:TEST.TEXT';

(* slots available in directory *)
MAXSUBTESTS = 20;
(* maximum question pool per test *)
MAXITEMPOOL = 300;

(* maximum # of sample questions allowed *)
MAXSAMPLES = 5;

(* printer file name *)
UNITNUMPRINTER = 'PRINTER: ';

VERSION = '[1.03]';

(* flag for compressed graphics *)
COMPRESSED = 1.0;

TYPE DIRDATA = PACKED RECORD (* directory for tests *)
    UNUSED : BOOLEAN; (* tells if record occupied *)
    TESTNAME : STRING; (* name of subtest *)
    (* subtest directory of question id codes *)
    ITEMCODE : PACKED ARRAY
        [0..MAXITEMPOOL]
        OF INTEGER;
END;

(* types of answers to questions *)
ITEMRESPONSES = (CHARVALUE,INTVALUE,SEVENCHR);

ITEMDATA = PACKED RECORD (* question ptrs/data *)
    (* flag this as graphics item *)
    GRAPHICS : BOOLEAN;
    (* bounds for response range *)
    LOWANSWER,
    HIGHANSWER : CHAR;
    (* block # where question text starts *)
    ITEMBLOCK,
    (* byte ptr where question text starts *)
    ITEMPTR,
    (* # of answers for multiple question screens *)
    ANSWERCOUNT : INTEGER;
    (* information parameters *)
    A,B,C,

    (* currently unused *)
    PROPCORRECT,

```

```

POINTBISERIAL,
YOPT,
XOPT,
DUMMY1,
DUMMY2,
DUMMY3 : REAL;

(* answer to question *)
CASE ATYPE : ITEMRESPONSES OF
  CHARVALUE : (ANSWER : CHAR);
  INTVALUE : (INTANSWER : INTEGER);
  SEVENCHR : (CHRANSWER : PACKED ARRAY[1..7] OF
    CHAR);
END;

SETOFCHAR = SET OF CHAR;

VAR LETTERS,DIGITS,CHARACTERS : SET OF CHAR;
    OUTPUT,COMMAND : CHAR;

(* screen character buffer, this is the page buffer for item editor *)
SCREEN : PACKED ARRAY
  [0..XSCREEN,0..YSCREEN] OF CHAR;

(* block of ascii, control codes *)
TRIX : RECORD CASE INTEGER OF
  1 : (ITEMBUF : ARRAY[0..1023] OF INTEGER);
  2 : (ASCIIBUF : PACKED ARRAY[0..MAX(ITEMBUF) OF 0..139];
END;

(* string character buffer *)
LINEBUF : PACKED ARRAY[0..MAXLINEBUF] OF CHAR;

RIGHTMAX, (* boundary for right margin of question text *)
PAGENUM, (* current page of question text *)
CURRINDEXRECNUM, (* record # of file directory *)
CURRBLOCK, (* block # of start of item text *)
CURRFREEPTR : INTEGER; (* ptr to free loc in block *)

CGRAF, (* true ==> picture is compressed graphics *)
ESCPROC, (* true ==> leave current procedure *)
SCR80, (* true ==> 80 columns screen *)
VNORMAL : BOOLEAN; (* true ==> normal video *)

AVALUE, (* item parameters *)
BVALUE,
CVALUE : REAL;

(* test directory *)
DIRECTORY : DIRDATA;
FILEIDIRECTORY : FILE OF DIRDATA;

(* data records *)
ITEMINFO : ITEMDATA;
FILEITEMINFO : FILE OF ITEMDATA;

(* file of ascii codes, control #'s *)
ITEMTEXT : FILE;

(* output file for test listings *)
DEST : TEXT;

(* directory record information *)
DIRINFO : ARRAY[0..MAXSUBTESTS] OF RECORD

  (* record occupied *)
  NOTUSED : BOOLEAN;

  (* subtest name *)
  TNAME : STRING;

  (* # items in subtest *)

```

```
ITEMCOUNT : INTEGER;
END;
```

```
PROCEDURE PAGE(DUMMY : CHAR); FORWARD;
PROCEDURE TOPOFFORM; FORWARD;
PROCEDURE SQUAWK; FORWARD;
PROCEDURE BLANKLINES(START,COUNT,ENDCURSOR : INTEGER); FORWARD;
FUNCTION GETCHAR(OKSET : SETOFCHAR;
                FLUSHQUEUE,ECHO,BEEP : BOOLEAN) : CHAR; FORWARD;
PROCEDURE STALL; FORWARD;
PROCEDURE FILLBUF(CHARCNT : INTEGER;
                OKSET : SETOFCHAR; ERASE : BOOLEAN); FORWARD;
PROCEDURE GETNEWFILE; FORWARD;
PROCEDURE SCRCONTROL(I,J,K : INTEGER); FORWARD;
PROCEDURE TEXT40MODE; FORWARD;
PROCEDURE TEXT80MODE; FORWARD;
PROCEDURE INVERSE; FORWARD;
PROCEDURE NORMAL; FORWARD;
PROCEDURE WRITEITEMBLOCK(WHICHBLOCK : INTEGER); FORWARD;
PROCEDURE READITEMBLOCK(WHICHBLOCK : INTEGER); FORWARD;
FUNCTION SLOTSEARCH(CODE : INTEGER) : INTEGER; FORWARD;
PROCEDURE UPATEDIRECTORY(RECNUM : INTEGER); FORWARD;
PROCEDURE UPDATEITEMFILE(RECNUM : INTEGER); FORWARD;
PROCEDURE SAVEPTRS; FORWARD;
PROCEDURE LOADPTRS; FORWARD;
FUNCTION HASH(KEY : INTEGER) : INTEGER; FORWARD;
PROCEDURE DECODEPRINT(BLOCKNUM,BLOCKPTR : INTEGER); FORWARD;
PROCEDURE GETPARAM(PTYPE : CHAR); FORWARD;
FUNCTION ITEMFREESLOT : INTEGER; FORWARD;
PROCEDURE SETGFLAG; FORWARD;
PROCEDURE SETSCREEN; FORWARD;
PROCEDURE GWRITESTR(GSTR : STRING); FORWARD;
PROCEDURE GGOTOXY(X,Y : INTEGER); FORWARD;
PROCEDURE INITFORGRAFIX; FORWARD;
PROCEDURE GWRITECHR(GCHR : CHAR); FORWARD;
PROCEDURE GWRITEINT(GINT : INTEGER); FORWARD;
PROCEDURE GWRITELN; FORWARD;
PROCEDURE GSTALL; FORWARD;
PROCEDURE GBLANKLINES(STARTBLANK,
                    BLANKTHISMANY,
                    LEAVECURSOR : INTEGER); FORWARD;
PROCEDURE GDECODEPRINT(SUBTESTNUM,ITEMCODE : INTEGER); FORWARD;
PROCEDURE CHANGESTESTNAME; FORWARD;
```

```
(*! /FILES/TMGR.DIR/T.LIST.TEXT *)      (* lists tests to output *)
(*! /FILES/TMGR.DIR/T.SEARCH.TEXT *)     (* searches for keywords in items *)
(*! /FILES/TMGR.DIR/T.1SUBRT.TEXT *)     (* utilities *)
(*! /FILES/TMGR.DIR/T.INSTR.TEXT *)       (* set up subtest instructions *)
(*! /FILES/TMGR.DIR/T.SAMPLES.TEXT *)     (* subtest sample set up *)
(*! /FILES/TMGR.DIR/T.GET1.TEXT *)       (* loads test, manipulate questions *)
(*! /FILES/TMGR.DIR/T.GET2.TEXT *)       (* loads test, manipulate questions *)
(*! /FILES/TMGR.DIR/T.FLOPPY.TEXT *)     (* transfer to floppy routine *)
(*! /FILES/TMGR.DIR/T.NEW.TEXT *)        (* new test/questions *)
(*! /FILES/TMGR.DIR/T.DELETE.TEXT *)     (* delete test *)
(*! /FILES/TMGR.DIR/T.SUBRT.TEXT *)      (* test manager utilities *)
(*! /FILES/TMGR.DIR/T.UTIL.TEXT *)       (* utility procedures *)
(*! /FILES/TMGR.DIR/T.IO.TEXT *)         (* io routines *)
```

(\* main program \*)

BEGIN

```
(* initialize character sets *)
DIGITS := ['0'..'9'];
LETTERS := ['A'..'Z','a'..'z'];
CHARACTERS := [CHR(32)..CHR(126)];
```

```
(* initialize string buffer to all blanks *)
```

```

FILLCHAR(LINEBUF(0),MAXLINEBUF,' ');

(* read all the subtests' directory information into a record saves direc- *)
(* tory information in main memory so we don't have to keep going to disk *)
(* to find out which subtests are in the database. *)
(* file : T.SUBRT.TEXT *)
GETDIRINFO;

INITFORGRAFIX;

(* loop until want to leave program *)
REPEAT

    (* set default screen conditions *)
    SCR80 := FALSE;
    VNORMAL := FALSE;
    CGRAF := FALSE;
    ESCPROC := FALSE;

    (* set right margin for question text editor *)
    RIGHTMAX := 38;

    (* display command menu *)
    (* file : T.SUBRT.TEXT *)
    MENU;

    (* get option selected *)
    COMMAND := GETCHAR(['1'..'8'],TRUE,FALSE,TRUE);
    CASE COMMAND OF

        (* leave program *)
        '1' : ;

        (* load subtest directory and present further options for subtest *)
        (* LOADTEST is in file : T.LIST *)
        (* FETCHTEST is in file : T.GET.TEXT *)
        '2' : BEGIN
            LOADTEST('Fetch which test? ');
            IF NOT ESCPROC THEN FETCHTEST;
            END;

        (* list all subtests in directory and how many questions in each *)
        (* file : T.LIST.TEXT *)
        '3' : LISTTESTS(TRUE);

        (* file : T.NEW.TEXT *)
        '4' : NEWTEST;

        (* change the subtest name or screen format for subtest or time speci- *)
        (* fication for timed subtests. *)
        (* file : T.1SUBRT.TEXT *)
        '5' : CHANGESTESTNAME;

        (* write the subtest to a floppy disk in similar but not the same file *)
        (* layout. Same record layout, however. *)
        (* file : T.FLOPPY.TEXT *)
        '6' : TRANSFERTOSINCH;

        (* remove a subtest from the directory *)
        (* file : T.DELETE.TEXT *)
        '7' : DELETETEST;

        '8' : SEARCHTEXT;
    END;
    UNTIL COMMAND = '1';

    (* jump to cat project driver *)
    SETCHAIN('CATDATA:CATPROJECT');

END. (* t-mgr *)

```

```

(*****)
(*)
(*)      Textfile : TMGR.DIR/T.1UTL.TEXT      Volume : TFILES      (*)
(*)      Codefile : T.MGR.CODE ('Include' file) Volume : CATDATA    (*)
(*)
(*****)
(*)      DEC. 1, 1982      NPRODC      (*)
(*****)

```

```

(* clear the screen *)
PROCEDURE PAGE;
BEGIN

```

```

    (* for apple 2 *)
    WRITE(CHR(12));

```

```

    (* for apple 3 *)
    WRITE(CHR(28));
    GOTOXY(0,0);
END; (* page *)

```

```

{-----}

```

```

(* form feeds the printer *)
PROCEDURE TOPOFFORM;
BEGIN
    REWRITE(DEST,UNITNUMPRINTER);
    WRITE(DEST,CHR(12));
    CLOSE(DEST,NORMAL);
END; (* top of form *)

```

```

{-----}

```

```

(*** rings the bell ***)
PROCEDURE SQUAWK;
BEGIN
    WRITE(CHR(BELL));
END; (* squawk *)

```

```

{-----}

```

```

(*** blank out lines ***)
(* given a y location to begin, # of lines to erase, which line *)
(* to leave cursor. erases only 40 column width. *)
PROCEDURE BLANKLINES;
VAR I : INTEGER;
BEGIN
    GOTOXY(0,START);
    FOR I := 1 TO (COUNT-1) DO
        WRITELN(' ' : 39);
        WRITE(' ' : 39);
        GOTOXY(0,ENDCURSOR);
    END; (* blanklines *)

```

```

{-----}

```

```

(* read an acceptable character from the keyboard *)
(* given a set of acceptable characters to read. *)
(* and flags if you want computer to flush the *)
(* type ahead buffer, beep if a bad key is pressed *)
(* or echo the character pressed. *)
FUNCTION GETCHAR;
VAR MASK : PACKED ARRAY[0..0] OF CHAR;
BEGIN
    IF FLUSHQUEUE THEN UNITCLEAR(2); (* flush buffer *)
    REPEAT
        UNITREAD(2,MASK,1);
        IF BEEP AND NOT (MASK[0] IN OKSET) THEN SQUAWK;
        UNTIL MASK[0] IN OKSET;
        IF ECHO AND (MASK[0] IN [CHR(32)..CHR(126)]) THEN
            WRITE(MASK[0]);
        GETCHAR := MASK[0];
    END; (* getchar *)

```

---

PROCEDURE FILLBUF:

---

.....

```

(*** get a legal filename ***)
FUNCTION NAMEOK : BOOLEAN;
VAR I : INTEGER;
BEGIN
  IF FILENAME = ''
  THEN BEGIN (1)
    FILENAME := DEFAULTFILE;
    GOTOXY(44,8);
    WRITE(FILENAME);
  END (1)
  ELSE IF FILENAME(1) = CHR(esc) THEN EXIT(PROGRAM);
  IF (POS('.TEXT',FILENAME) <> (LENGTH(FILENAME) - 4)) OR
  (LENGTH(FILENAME) < 6)
  THEN FILENAME := CONCAT(FILENAME, '.TEXT');
  (*$!-$)
  RESET(DEST,FILENAME);
  (*$!+*)
  IF IORESULT = 0
  THEN BEGIN (2)
    WRITELN;
    WRITELN;
    WRITE('Destroy old ',FILENAME,'? Press ''N'' or ''Y'' ');
    IF GETCHAR(['Y','N'],TRUE,TRUE,TRUE) IN ['Y','y']
    THEN BEGIN (3)
      CLOSE(DEST,PURGE);
      REWRITE(DEST,FILENAME);
      NAMEOK := TRUE;
    END (3)
    ELSE BEGIN (4)
      CLOSE(DEST,LOCK);
      NAMEOK := FALSE;
    END (4)
  END (2)
  ELSE BEGIN (5)
    (*$!-$)
    REWRITE(DEST,FILENAME);
    (*$!+*)
    ERRNUM := IORESULT;
    IF IORESULT <> 0
    THEN BEGIN (6)
      WRITELN;
      WRITELN;
      WRITELN('Cannot open ',FILENAME,' to error #',ERRNUM);
      NAMEOK := FALSE;
    END (6)
    ELSE NAMEOK := TRUE;
  END (5)
END; (* nameok *)

(.....)

BEGIN (* getnewfile *)
  REPEAT
    PAGE(OUTPUT);
    WRITE('Enter output file name, then press <RET> : ');
    READLN(FILENAME);
  UNTIL NAMEOK;
END;

(-----)

(* send control characters to screen *)
PROCEDURE SCRCONTROL; ( PASCAL interface to Screen Control)
VAR N: INTEGER; ( APPLE III Standard Device Drivers)
    G_ARRAY:PACKED ARRAY[0.. 3] OF 0..255; (..... Pages 34 to 46.)
BEGIN
  G_ARRAY[0] := I; G_ARRAY[1] := J; G_ARRAY[2] := K;
  UNTHWRITE(1,G_ARRAY,3,12);
END; (* scrcontrol *)

(-----)

(* switch to 40 column screen *)

```

```
PROCEDURE TEXT40MODE;  
BEGIN  
  SCRCONTROL(16,0,28);      (Text mode 40BW, followed by clearscreen.)  
END; (* text40mode *)  
  
-----  
  
(* switch to 80 column screen *)  
PROCEDURE TEXT80MODE;  
BEGIN  
  SCRCONTROL(04,0,0);      (Restore Viewport to its original condition.)  
  SCRCONTROL(16,2,28);     (Text Mode 80, followed by clearscreen.)  
END; (* text80mode *)  
  
-----  
  
(* turn on reverse video *)  
(* black on white *)  
PROCEDURE INVERSE;  
BEGIN  
  SCRCONTROL(18,0,0);  
END; (* inverse *)  
  
-----  
  
(* switch back to normal screen *)  
(* white on black *)  
PROCEDURE NORMAL;  
BEGIN  
  SCRCONTROL(17,0,0);  
END;
```

```

(*-----*)
(*      Textfile : TMGR.DIR/T.SUBRT.TEXT      Volume : TFILES      *)
(*      Codefile : T.MGR.CODE ('Include' file) Volume : CATDATA     *)
(*-----*)
(* File last modified : Feb 23,1983                      NPRDC      *)
(*-----*)

(* change the name of a subtest or change screen format or change time cutoff *)
(* for timed subtests. *)
PROCEDURE CHANGETESTNAME;
VAR TESTSTR : STRING;

    (* give instructions *)
    PROCEDURE GINSTRUCT;
    BEGIN
        PAGE(OUTPUT);
        GOTOXY(18,0);
        WRITE('SUBTEST NAME FORMAT INSTRUCTIONS');
        GOTOXY(0,2);
        WRITELN(
            'The first character of the subtest name specifies which screen format the ');
        WRITELN(
            'question text will appear in. The screen codes are listed below. The ');
        WRITELN(
            'second character of the subtest name specifies the total permitted time ');
        WRITELN(
            'in minutes for timed subtests. The second and third characters specify ');
        WRITELN(
            'the additional seconds permitted for the timed tests. Type in the subtest ');
        WRITELN(
            'name then press <RET>.' );

        WRITELN;
        WRITELN('***' as first char = inverse + 80 columns');
        WRITELN('**e' as first char = normal + 80 columns');
        WRITELN('***?' as first char = normal + 40 columns');
        WRITELN;
        WRITELN(
            'If first character of test name is not any of the above control characters,');
        WRITELN('then the text format will default to inverse + 40 columns. ');
        WRITELN;
        WRITELN;
        WRITELN('Change ',DIRECTORY.TESTNAME,' to what?');
        WRITELN;
        WRITE('-----> ');
    END; (* ginstruct *)

BEGIN (* changetestname *)
    (* get the subtest you want to change *)
    LOADTEST('Change name of which subtest? ');

    IF ESCPROC THEN EXIT(CHANGETESTNAME);

    (* give instructions *)
    GINSTRUCT;

    (* get the new test name *)
    READLN(TESTSTR);

    IF TESTSTR = '' THEN TESTSTR := DIRECTORY.TESTNAME;

    WRITELN;
    WRITELN(DIRECTORY.TESTNAME,' changed to ',TESTSTR);

    (* save the new name in the files *)
    DIRECTORY.TESTNAME := TESTSTR;
    DIRINFO(CURRINDEXRECNUM).TNAME := TESTSTR;
    UPDATEDIRECTORY(CURRINDEXRECNUM);
    WRITELN;

```

```

    STALL;
END; (* change test name *)

{-----}

(**** show main menu command level selections ***)
PROCEDURE MENU;
VAR X,Y : INTEGER;
BEGIN
    PAGE(OUTPUT);
    GOTOXY(20,0);
    WRITE('TEST MANAGER MENU ',VERSION);
    GOTOXY(0,4);
    WRITE('Select one of the following procedures by entering its number.');
```

X := 16;

Y := 8;

GOTOXY(X,Y);

WRITE('1. QUIT');

GOTOXY(X,Y+1);

WRITE('2. FETCH A SUBTEST');

GOTOXY(X,Y+2);

WRITE('3. LIST DIRECTORY');

GOTOXY(X,Y+3);

WRITE('4. CREATE NEW SUBTEST');

GOTOXY(X,Y+4);

WRITE('5. CHANGE SUBTEST NAME/FORMAT');

GOTOXY(X,Y+5);

WRITE('6. TRANSFER SUBTEST TO FLOPPY');

GOTOXY(X,Y+6);

WRITE('7. DELETE SUBTEST');

GOTOXY(X,Y+7);

WRITE('8. SEARCH TEXT FOR KEYWORDS');

GOTOXY(X,Y+10);

WRITE('Enter Choice # : ');

END; (\* menu \*)

{-----}

(\* writes the directory information to record \*)

(\* puts necessary file info in main memory \*)

PROCEDURE GETDIRINFO;

VAR I,K,ICOUNT : INTEGER;

BEGIN

(\* initialize the directory information \*)

FOR I := 0 TO MAXSUBTESTS DO

DIRINFO[I].NOTUSED := TRUE;

(\* get the directory information \*)

I := 0;

RESET(FILEDIRECTORY,INDEXNAME);

REPEAT

SEEK(FILEDIRECTORY,I);

GET(FILEDIRECTORY);

IF NOT (FILEDIRECTORY^.UNUSED) THEN

BEGIN (1)

DIRECTORY := FILEDIRECTORY^;

DIRINFO[I].NOTUSED := FALSE;

DIRINFO[I].TNAME := DIRECTORY.TESTNAME;

ICOUNT := 0;

FOR K := (MAXSAMPLES+1) TO MAXITEMPOOL DO

IF DIRECTORY.ITEMCODE(K) > 0

THEN

ICOUNT := ICOUNT + 1;

DIRINFO[I].ITEMCOUNT := ICOUNT;

END; (1)

I := I + 1;

UNTIL I > MAXSUBTESTS;

CLOSE(FILEDIRECTORY,NORMAL);

END; (\* getdirinfo \*)

{-----}

```
(* returns record # of question data file no collisions. This is a mapping *)
(* function which takes the location a question code exists in a subtest *)
(* directory, the maximum questions per subtest and the subtest record number *)
(* and maps it to a location in a file with data for that question *)
```

```
FUNCTION HASH;
BEGIN
  HASH :=
    (CURRINDEXRECNUM * MAXITEMPOOL)
    + KEY + CURRINDEXRECNUM;
END; (* hash *)
```

-----

```
(* reads the item text file & displays item text *)
```

```
PROCEDURE DECODEPRINT;
CONST MAXBUFSIZE = 2047;
VAR X,
    Y,
    B,
    CURRPTR,
    CURRBLK,
    CHARCODE,
    CHARCNT : INTEGER;
```

```
BADIO : BOOLEAN;
```

```
TEXTSTR : STRING(80);
```

-----

```
(* return the next code in ascii file *)
```

```
FUNCTION BUFCODE : INTEGER;
BEGIN
  BUFCODE := TRIX.ASCIIBUF(CURRPTR);
  CURRPTR := CURRPTR + 1;
  IF CURRPTR > 2047 THEN
    (* end of block/get next block and reset byte ptr *)
    BEGIN (1)
      CURRBLK := CURRBLK + 4;
      READITEMBLOCK(CURRBLK);
      CURRPTR := 0;
    END; (1)
  END; (* bufcodes *)
```

.....

```
BEGIN (* decode print *)
```

```
  TEXTSTR :=
```

```
    SETSCREEN; (* clear the screen *)
```

```
    READITEMBLOCK(BLOCKNUM);
```

```
    (* set block/byte ptrs *)
```

```
    CURRPTR := BLOCKPTR;
```

```
    CURRBLK := BLOCKNUM;
```

```
    FILLCHAR(LINEBUF(0),80,' ');
```

```
    (* read bytes from the buffer *)
```

```
    REPEAT
```

```
      (* get char from block buffer *)
```

```
      CHARCODE := BUFCODE;
```

```
    CASE CHARCODE OF
```

```
      GOTOFLAG : BEGIN (1) (* move cursor *)
```

```
        (* next two bytes after flag are x,y coord *)
```

```
        X := BUFCODE;
```

```
        Y := BUFCODE;
```

```
        CHARCNT := BUFCODE;
```

```
        IF (CURRPTR + CHARCNT - 1) > MAXBUFSIZE THEN
```

```
          BEGIN (2)
```

```
            B := (MAXBUFSIZE + 1) - CURRPTR;
```

```
            MOVELEFT(TRIX.ASCIIBUF(CURRPTR),LINEBUF(X),B);
```

```

        X := X + B;
        B := CHARCNT - B;
        CURRBLK := CURRBLK + 4;
        READITEMBLOCK(CURRBLK);
        CURRPTR := 0;
        MOVELEFT(TRIX.ASCIIBUF(CURRPTR),LINEBUF(X),B);
        CURRPTR := CURRPTR + B;
    END (2)
ELSE
    BEGIN (3)
        MOVELEFT(TRIX.ASCIIBUF(CURRPTR),LINEBUF(X),CHARCNT);
        CURRPTR := CURRPTR + CHARCNT;
        IF CURRPTR > MAXBUFSIZE THEN
            BEGIN (4)
                CURRBLK := CURRBLK + 4;
                CURRPTR := 0;
                READITEMBLOCK(CURRBLK);
            END; (4)
        END; (3)

        GOTOXY(0,Y);
        WRITE(LINEBUF);
        FILLCHAR(LINEBUF(0),80,' ');
    END; (1)
PAGEFLAG : BEGIN (5) (* wait for keystroke to see rest of text *)
        GOTOXY(1,21);
        STALL;
        PAGE(OUTPUT);
    END; (5)
ENDITEM : ;

END;
UNTIL CHARCODE = ENDITEM; (* until end flag hit *)
END; (* decodeprint *)

```

```

-----
(* gets the a,b, and c parameters for items *)
PROCEDURE GETPARAM;
VAR VALUE : REAL;
BEGIN
    PAGE(OUTPUT);
    WRITE('Enter ',PTYPE,' parameter value, then press <RET> : ');
    (*!~*)
    READLN(VALUE);
    (*!+*)
    CASE PTYPE OF
        'A' : AVALUE := VALUE;
        'B' : BVALUE := VALUE;
        'C' : CVALUE := VALUE;
    END; (* cases *)
END; (* get param *)

```

```

-----
(* returns ptr to 1st free slot in subtest directory to put item *)
(* code. Returns nil if no room. *)
FUNCTION ITEMFREESLOT;
VAR SLOT : INTEGER;
    FOUND : BOOLEAN;
BEGIN
    SLOT := MAXSAMPLES + 1;
    FOUND := FALSE;
    REPEAT
        IF DIRECTORY.ITEMCODE(SLOT) < 0
        THEN
            FOUND := TRUE
        ELSE
            SLOT := SLOT + 1;
    UNTIL (SLOT > MAXITEMPOOL) OR (FOUND);
    IF FOUND
    THEN

```

```

ITEMFREESLOT := SLOT
ELSE
ITEMFREESLOT := NIL;
END; (* itemfreeslot *)

{-----}

(* set the graphics flag *)
PROCEDURE SETGFLAG;
VAR SELECT : CHAR;
BEGIN
PAGE(OUTPUT);
GOTOXY(20,0);
WRITE('SET GRAPHICS FLAG MENU');
GOTOXY(0,4);
WRITE('Select one of the following options by entering its number. ');
GOTOXY(16,8);
WRITE('1. QUIT');
GOTOXY(16,9);
WRITE('2. GRAPHICS FLAG OFF (no graphic text)');
GOTOXY(16,10);
WRITE('3. NORMAL GRAPHICS FLAG ON');
GOTOXY(16,11);
WRITE('4. COMPRESSED GRAPHICS FLAG ON');
REPEAT
GOTOXY(0,6);
WRITE('You currently have option ');
IF NOT ITEMINFO.GRAPHICS THEN
WRITE('2 (no graphic text) ');
ELSE
IF ITEMINFO.DUMMY1 = COMPRESSED THEN
WRITE('4 (compressed graphic text)');
ELSE
WRITE('3 (normal graphic text) ');
INVERSE;
IF ITEMINFO.GRAPHICS THEN
BEGIN (1)
IF ITEMINFO.DUMMY1 = COMPRESSED THEN
BEGIN
GOTOXY(16,11);
WRITE('4. COMPRESSED GRAPHICS FLAG ON');
END
ELSE
BEGIN
GOTOXY(16,10);
WRITE('3. NORMAL GRAPHICS FLAG ON');
END;
END (1)
ELSE
BEGIN (2)
GOTOXY(16,9);
WRITE('2. GRAPHICS FLAG OFF (no graphic text)');
END; (2)
NORMAL;
GOTOXY(31,14);
WRITE(' ');
GOTOXY(16,14);
WRITE('Enter Choice # : ');
SELECT := GETCHAR(['1'..'4'],TRUE,TRUE,TRUE);
IF ITEMINFO.GRAPHICS THEN
BEGIN (3)
IF ITEMINFO.DUMMY1 = COMPRESSED THEN
BEGIN
GOTOXY(16,11);
WRITE('4. COMPRESSED GRAPHICS FLAG ON');
END
ELSE
BEGIN
GOTOXY(16,10);
WRITE('3. NORMAL GRAPHICS FLAG ON');
END;
END (3)
ELSE

```

```

      BEGIN (4)
        GOTOXY(16,9);
        WRITE('2. GRAPHICS FLAG OFF (no graphic text)');
      END; (4)
    CASE SELECT OF
      '1' : ;
      '2' : ITEMINFO.GRAPHICS := FALSE;
      '3' : BEGIN
              ITEMINFO.GRAPHICS := TRUE;
              ITEMINFO.DUMMY1 := 0.0;
            END;
      '4' : BEGIN
              ITEMINFO.GRAPHICS := TRUE;
              ITEMINFO.DUMMY1 := COMPRESSED;
            END;
    END; (* cases *)
  UNTIL SELECT = '1';
END; (* setgflag *)

(-----)

(* this procedure changes the screen based on global vars *)
PROCEDURE SETSCREEN;
BEGIN

  (* set the column length *)
  IF SCR80 THEN
    BEGIN (1)
      TEXT80MODE;
      RIGHTMAX := 78;
    END (1)
  ELSE
    BEGIN (2)
      TEXT40MODE;
      RIGHTMAX := 38;
    END; (2)

  (* set the video display *)
  IF VNORMAL
  THEN
    NORMAL
  ELSE
    INVERSE;

  PAGE(OUTPUT);
END; (* setscreen *)

(-----)

(* does a write to graphics screen for string values *)
PROCEDURE GWRITESTR;
BEGIN
  UNITWRITE(3,GSTR(1),LENGTH(GSTR),0,12);
END; (* gwrtestr *)

(-----)

(* do a gotoxy to the graphics screen, treats graphics screen as if it *)
(* had textmode coordinates for 80 column by 24 rows. *)
PROCEDURE GGOTOXY;
VAR XPOS,
    YPOS : INTEGER;
BEGIN
  XPOS := X * 7;
  YPOS := 191 - (Y * 8);
  MOVETO(XPOS,YPOS);
END; (* ggotoxy *)

(-----)

(* set up the grafix mode *)
PROCEDURE INITFORGRAFIX;
BEGIN

```

```
INITGRAFIX;
GRAFIXMODE(BW560,1);
VIEWPORT(0,559,0,191);
FILLCOLOR(WHITE);
PENCOLOR(BLACK);
FILLPORT;
END; (* initforgrafix *)
```

-----

(\* does a write to graphics screen for char values \*)

```
PROCEDURE GWRITECHR;
VAR C : STRING;
BEGIN
  C := ' ';
  C[1] := GCHR;
  UNITWRITE(3,C[1],1,0,12);
END; (* gwritechr *)
```

-----

(\* does a write to graphics screen for integer values \*)

```
PROCEDURE GWRITEINT;
VAR X,Z : INTEGER;
    DIGITSTR,STR : STRING;
    NEGATIVE : BOOLEAN;
    C : CHAR;
BEGIN
  NEGATIVE := FALSE;
  Z := GINT;
  IF GINT < 0 THEN
    BEGIN
      NEGATIVE := TRUE;
      Z := -GINT;
    END;
  DIGITSTR := ' ';
  STR := '';
  REPEAT
    X := Z MOD 10;
    C := CHR(X+48);
    DIGITSTR[1] := C;
    STR := CONCAT(DIGITSTR,STR);
    Z := Z DIV 10;
  UNTIL Z <= 0;
  IF NEGATIVE THEN
    STR := CONCAT('-',STR);
  UNITWRITE(3,STR[1],LENGTH(STR),0,12);
END; (* gwriteint *)
```

-----

(\* do a writeln to the graphics screen \*)

```
PROCEDURE GWRITELN;
BEGIN
  MOVETO(0,YLOC-8);
END; (* gwriteln *)
```

-----

(\* does a stall to the graphics screen \*)

```
PROCEDURE GSTALL;
BEGIN
  GWRITESTR('Press <RET> to continue ');
  IF GETCHAR([CHR(RET)],TRUE,FALSE,TRUE) = CHR(RET) THEN;
END; (* gstall *)
```

-----

(\* blanklines on the graphics screen, treat as if in textmode \*)

```
PROCEDURE GBLANKLINES;
VAR TOP,
    BOTTOM : INTEGER;
BEGIN
```

```

TOP := 191 - (STARTBLANK * 8);
BOTTOM := 191 - ((STARTBLANK + BLANKTHISMANY) * 8);
VIEWPORT(0,559,BOTTOM,TOP);
FILLPORT;
VIEWPORT(0,559,0,191);
GGOTOXY(0,LEAVECURSOR);
END; (* gblanklines *)

```

-----

```

(* display question to graphics screen *)
PROCEDURE GDECODEPRINT;
VAR X,Z : INTEGER;
    VNAME,FNAME,DIGITSTR,STR : STRING;
    C : CHAR;

```

```

(* reads the item text file and displays the graphics *)
PROCEDURE DECODEGRAF;

```

```

VAR X,
    Y,
    X1,Y1,
    CURRPTR,
    CURRBLK,
    DOTCNT : INTEGER;

```

```

(* reads a block from disk into the item ascii buffer *)

```

```

PROCEDURE READITEMBLOCK(WHICHBLOCK : INTEGER);
VAR BLOCKSTRANSFERRED : INTEGER;
    BADIO : BOOLEAN;
BEGIN
    BADIO := FALSE;
    RESET(ITEMTEXT,FNAME);
    BLOCKSTRANSFERRED := BLOCKREAD(ITEMTEXT,TRIX.ITEMBUF,4,WHICHBLOCK);
    BADIO := ((BLOCKSTRANSFERRED < 4) OR (IORESULT <> 0));
    CLOSE(ITEMTEXT,LOCK);
    IF BADIO THEN
    BEGIN
        WRITELN;
        WRITELN;
        WRITE('Block ', WHICHBLOCK, ' write error. ');
        WRITELN;
        READLN;
        EXIT(PROGRAM);
    END;
END; (* readitemblock *)

```

```

(* reads the item text file & displays item text *)

```

```

PROCEDURE DECODEPRINT;
VAR X,
    Y,
    BYTECNT,
    CHARCODE : INTEGER;

```

```

(* return the next code in ascii file *)

```

```

FUNCTION BUFCODE : INTEGER;
BEGIN
    BUFCODE := TRIX.ASCIIBUF(CURRPTR);
    CURRPTR := CURRPTR + 1;
    IF CURRPTR > 2047 THEN
    (* end of block/get next block and reset byte ptr *)
    BEGIN (1)
        CURRBLK := CURRBLK + 4;
        READITEMBLOCK(CURRBLK);
        CURRPTR := 0;
    END; (1)
END; (* bufcodes *)

```

```

BEGIN (* decode print *)
  (* read bytes from the buffer *)
  REPEAT

    (* get char from block buffer *)
    CHARCODE := BUFCODE;

    CASE CHARCODE OF
      GOTOFLAG : BEGIN (1)      (* move cursor *)
                    (* next two bytes after flag are x,y coord *)
                    X := BUFCODE;
                    Y := BUFCODE;
                    BYTECNT := BUFCODE;
                    GGOTOXY(X,Y);
                  END; (1)
      ENDITEM  : ;

    END;

    IF (CHARCODE >= 32) AND (CHARCODE <= 126) THEN
      GWRITECHR(CHR(CHARCODE));

    UNTIL CHARCODE = ENDITEM; (* until end flag hit *)
  END; (* decodeprint *)


BEGIN (* decode graf *)

  READITEMBLOCK(0);

  CURRBLK := 0;
  CURRPTR := 0;

  (* decode the xlines *)
  REPEAT
    IF CURRPTR > 1021 THEN
      (* end of block/get new block *)
      BEGIN
        CURRBLK := CURRBLK + 4;
        READITEMBLOCK(CURRBLK);
        CURRPTR := 0;
      END;
    X := TRIX.ITEMBUF(CURRPTR);
    IF X >= 0 THEN
      BEGIN
        Y := TRIX.ITEMBUF(CURRPTR + 1);
        MOVETO(X,Y);
        DOTCNT := TRIX.ITEMBUF(CURRPTR + 2);
        LINEREL(DOTCNT,0);
        CURRPTR := CURRPTR + 3;
      END;
    UNTIL X < 0;

    CURRPTR := CURRPTR + 1;

  (* decode the ylines *)
  REPEAT
    IF CURRPTR > 1021 THEN
      (* end of block/get new block *)
      BEGIN
        CURRBLK := CURRBLK + 4;
        READITEMBLOCK(CURRBLK);
        CURRPTR := 0;
      END;
    X := TRIX.ITEMBUF(CURRPTR);
    IF X >= 0 THEN
      BEGIN
        Y := TRIX.ITEMBUF(CURRPTR + 1);
        MOVETO(X,Y);

```

```

        DOTCNT := TRIX.ITEMBUF(CURRPTR + 2);
        LINEREL(0,DOTCNT);
        CURRPTR := CURRPTR + 3;
    END;
    UNTIL X < 0;

    CURRPTR := CURRPTR + 1;

    (* decode the diagonals *)
    REPEAT
        IF CURRPTR > 1020 THEN
            (* end of block/get new block *)
            BEGIN
                CURRBLK := CURRBLK + 4;
                READITEMBLOCK(CURRBLK);
                CURRPTR := 0;
            END;
            X := TRIX.ITEMBUF(CURRPTR);
            IF X >= 0 THEN
                BEGIN
                    Y := TRIX.ITEMBUF(CURRPTR + 1);
                    X1 := TRIX.ITEMBUF(CURRPTR + 2);
                    Y1 := TRIX.ITEMBUF(CURRPTR + 3);
                    MOVETO(X,Y);
                    LINETO(X1,Y1);
                    CURRPTR := CURRPTR + 4;
                END;
            UNTIL X < 0;

            CURRPTR := CURRPTR + 1;

            (* decode the dots *)
            REPEAT
                IF CURRPTR > 1022 THEN
                    (* end of block/get new block *)
                    BEGIN
                        CURRBLK := CURRBLK + 4;
                        READITEMBLOCK(CURRBLK);
                        CURRPTR := 0;
                    END;
                    X := TRIX.ITEMBUF(CURRPTR);
                    IF X >= 0 THEN
                        BEGIN
                            Y := TRIX.ITEMBUF(CURRPTR + 1);
                            DOTAT(X,Y);
                            CURRPTR := CURRPTR + 2;
                        END;
                    UNTIL X < 0;

                    CURRPTR := CURRPTR + 1;
                    CURRPTR := CURRPTR * 2;

                    DECODEPRINT;

                    END;    (* decodegraf *)

    BEGIN
        FILLPORT;
        GRAFIXON;
        DIGITSTR := ' ';
        STR := '';
        Z := ITEMCODE;
        REPEAT
            X := Z MOD 10;
            C := CHR(X+48);
            DIGITSTR(1) := C;
            STR := CONCAT(DIGITSTR,STR);
            Z := Z DIV 10;
        UNTIL Z <= 0;
        DIGITSTR(1) := CHR(SUBTESTNUM+65);
        C := DIGITSTR(1);

```

```
(*  
IF SAMPLEQUESTION THEN  
BEGIN  
  FNAME := CONCAT('/CATFOTO/',DIGITSTR,'DIR/G',DIGITSTR,'SQ',STR,'.FOTO');  
  GLOAD(FNAME);  
END  
ELSE  
*)  
  
IF ITEMINFO.DUMMY1 = COMPRESSED THEN  
BEGIN  
  FNAME := CONCAT('/CATFOTO/',DIGITSTR,'DIR/G',DIGITSTR,STR,'.DATA');  
  DECODEGRAF;  
END  
ELSE  
BEGIN  
  FNAME := CONCAT('/CATFOTO/',DIGITSTR,'DIR/G',DIGITSTR,'Q',STR,'.FOTO');  
  GLOAD(FNAME);  
END;  
END; (* gdecodeprint *)
```

```

(*****)
(*)
(*)      Textfile : TMGR.DIR/T.1SUBRT.TEXT      Volume : TFILES      (*)
(*)      Codefile : T.MGR.CODE ('Include' file) Volume : CATDATA      (*)
(*)
(*****)
(*) File last modified : MAY 25, 1983      NPRDC      (*)
(*****)

```

```

(*) codes the screen array into compact block buffer and writes it to disk. *)
SEGMENT PROCEDURE CODESCREEN(ENDDOITEM : BOOLEAN);

```

```

VAR X0,
    CHARCODE,X,Y,I,
    BLOCK,
    BYTE,
    BYTECOUNT : INTEGER;
DONE : BOOLEAN;

```

```

[.....]

```

```

(*) fill buffer with ascii & codes, write to disk *)

```

```

PROCEDURE FILLITEMBUFFER(BUFFCODE : INTEGER);

```

```

BEGIN

```

```

    TRIX.ASCIIBUF(CURRFREEPTR) := BUFFCODE;

```

```

    CURRFREEPTR := CURRFREEPTR + 1;

```

```

    IF CURRFREEPTR >= 2048 THEN

```

```

        BEGIN (1)

```

```

            WRITEITEMBLOCK(CURRBLOCK);

```

```

            CURRBLOCK := CURRBLOCK + 4;

```

```

            CURRFREEPTR := 0;

```

```

        END; (1)

```

```

    END; (* fillitembuffer *)

```

```

[.....]

```

```

BEGIN (* codescreen *)

```

```

    (*) read in current block where text will start, into buffer *)

```

```

    READITEMBLOCK(CURRBLOCK);

```

```

    (*) display message *)

```

```

    PAGE(OUTPUT);

```

```

    GOTOXY(1,1);

```

```

    WRITE('Entering text');

```

```

    (*) start at line 0 of screen buffer *)

```

```

    Y := 0;

```

```

    REPEAT

```

```

        (*) point to first character on line *)

```

```

        X := 0;

```

```

        WRITE('.');

```

```

        (*) look for leading blanks *)

```

```

        DONE := FALSE;

```

```

        REPEAT

```

```

            IF SCREEN(X,Y) = CHR(SPACE)

```

```

            THEN

```

```

                X := X + 1

```

```

            ELSE

```

```

                DONE := TRUE;

```

```

        UNTIL (X > XSCREEN) OR (DONE);

```

```

        (*) if the whole line was not blank *)

```

```

        IF X <= XSCREEN THEN

```

```

            BEGIN (1)

```

```

                (*) flag a gotoxy where first non-blank character begins *)

```

```

                FILLITEMBUFFER(GOTOFLAG);

```

```

                FILLITEMBUFFER(X);

```

```

                FILLITEMBUFFER(Y);

```

```

                BYTECOUNT := 0;

```

```

(* figure out how many bytes on this line *)
X0 := X;

REPEAT
  I := X0;
  DONE := FALSE;

  REPEAT
    IF SCREEN(I,Y) = CHR(SPACE)
    THEN
      I := I + 1
    ELSE
      DONE := TRUE;
  UNTIL (I > XSCREEN) OR (DONE);

  IF I < XSCREEN THEN
    BEGIN (2)
      BYTECOUNT := BYTECOUNT + 1;
      X0 := X0 + 1;
      DONE := FALSE;
    END (2)
  ELSE
    DONE := TRUE;
  UNTIL (DONE) OR (X0 > XSCREEN);

  FILLITEMBUFFER(BYTECOUNT);

  REPEAT

    (* look for trailing blanks *)
    I := X;
    DONE := FALSE;

    REPEAT
      IF SCREEN(I,Y) = CHR(SPACE)
      THEN
        I := I + 1
      ELSE
        DONE := TRUE;
    UNTIL (I > XSCREEN) OR (DONE);

    (* if the rest of the line was not all blanks *)
    IF I < XSCREEN THEN
      BEGIN (3)

        (* save the character in the block buffer *)
        FILLITEMBUFFER(ORD(SCREEN(X,Y)));

        (* set pointer to next character *)
        X := X + 1;

        (* set loop condition to process next character *)
        DONE := FALSE;
      END (3)
    ELSE

      (* done with this line, go look at next line in screen buffer *)
      DONE := TRUE;

    (* until done with line or last character in line processed *)
  UNTIL (DONE) OR (X > XSCREEN);
END; (1)

(* point to next line *)
Y := Y + 1;

(* until all lines looked at *)
UNTIL Y >= YSCREEN;

(* if editing was cancelled with a control - c *)
IF ENDOFITEM
THEN

```

```

    (* flag end of question text *)
    FILLITEMBUFFER(ENDITEM)
ELSE
    (* editing was temporarily cancelled with a control - p *)
    (* flag that text continues on another page. *)
    FILLITEMBUFFER(PAGEFLAG);

    (* write the last block of ascii to file *)
    WRITEITEMBLOCK(CURRBLOCK);

END; (* codescreen *)

{-----}

(* fills an array representing the crt with char screen location may be *)
(* specified this is the guts of the question text editor *)
SEGMENT PROCEDURE FILLSCREENBUFFER(UPBOUND,RIGHTBOUND,
                                  LOBOUND,LEFTBOUND : INTEGER;
                                  FLUSHBUF : BOOLEAN);

VAR SCREENCHAR : CHAR;
    CONTROLCHAR : SETOFCHAR;
    SCREENBYTES,
    CHARCODE,
    X,
    Y,
    L,
    RIGHT : INTEGER;
    MORE : BOOLEAN;

BEGIN

    (* save right boundary *)
    RIGHT := RIGHTBOUND;

    (* initialize indicator for additional lines *)
    MORE := FALSE;

    (* initialize the page count *)
    PAGENUM := 1;

    (* set # of bytes in screen character buffer *)
    SCREENBYTES := (XSCREEN + 1) * (YSCREEN + 1);

    (* if wish to start with a blank buffer, new text *)
    IF FLUSHBUF THEN
        BEGIN (1)
            (* clear screen *)
            FILLCHAR(SCREEN[0],SCREENBYTES,' ');

            (* set the screen parameters *)
            SETSCREEN;
        END; (1)

    (* put cursor in upper left hand corner *)
    X := LEFTBOUND;
    Y := UPBOUND;

    CONTROLCHAR := [CHR(UP),CHR(DOWN),CHR(LARROW),CHR(RARROW),
                   CHR(ETX),CHR(PAGEOUT),CHR(RET),CHR(ESC)];

    CHARCODE := PAGEOUT;

    BLANKLINES(20,4,21);

    (* fill up the screen character buffer until done *)
    REPEAT

        (* page number and instructions *)
        IF CHARCODE = PAGEOUT THEN
            BEGIN (2)
                IF MORE THEN GOTOXY(0,2)
                ELSE GOTOXY(0,20);
            END; (2)
    UNTIL FALSE;

```

```

FOR L := 1 TO RIGHT DO
  WRITE('-');WRITELN('-');
  WRITELN(' Enter text. Use arrows to move cursor. ');
  WRITELN(' <RET>:next line, <CTRL>-P:new page. ');
  WRITE(' <CTRL>-C to quit and save. ');
END; (2)

(* monitor cursor location *)
GOTOXY(X,Y);

(* get a character from the keyboard *)
SCREENCHAR := GETCHAR(CHARACTERS + CONTROLCHAR,TRUE,TRUE,TRUE);

(* get the ascii value *)
CHARCODE := ORD(SCREENCHAR);

(* check for cursor control characters *)
CASE CHARCODE OF

  (* cursor moved up but not beyond set boundaries *)
  UP : IF Y <= UPBOUND
      THEN
        SQUAWK
      ELSE
        Y := Y - 1;

  (* cursor moved down but not beyond set boundaries *)
  DOWN : IF Y >= LOBOUND
      THEN
        SQUAWK
      ELSE
        IF MORE THEN
          BEGIN
            IF Y >= 1 (* gives 2 lines at top *)
            THEN SQUAWK
            ELSE
              Y := Y + 1
            END
          ELSE
            Y := Y + 1;

  (* cursor moved to left with auto wrap around *)
  LARROW : IF X <= LEFTBOUND THEN
      BEGIN (3)
        IF Y <= UPBOUND
          THEN
            SQUAWK
          ELSE
            BEGIN (4)
              X := RIGHT;
              Y := Y - 1;
            END; (4)
          END (3)
        ELSE
          X := X - 1;

  (* cursor moved to right with auto wraparound *)
  RARROW : IF X >= RIGHT THEN
      BEGIN (5)
        IF (Y >= LOBOUND) OR (MORE AND (Y >= 1))
          THEN
            SQUAWK
          ELSE
            BEGIN (6)
              Y := Y + 1;
              X := LEFTBOUND;
            END; (6)
          END (5)
        ELSE
          X := X + 1;

```

```

(* carriage return *)      (* if at bottom line then make room *)
RET : IF (Y >= LOBOUND) OR MORE
THEN
  BEGIN
    IF NOT PCRECNUM
    THEN
      SQUAWK
    ELSE
      IF MORE AND (Y >= 1)  (* border after 2 lines *)
      THEN
        SQUAWK
      ELSE
        IF NOT MORE THEN
        BEGIN
          MORE := TRUE;
          CHARCODE := PAGEOUT;
          PAGE (OUTPUT);
          IF NOT FLUSHBUF THEN
          BEGIN
            GOTOXY (LEFTBOUND,UPBOUND);
            FOR X:= LEFTBOUND TO RIGHT DO WRITE (SCREEN(X,20));
            WRITELN;
            FOR X:= LEFTBOUND TO RIGHT DO WRITE (SCREEN(X,21));
          END;
          X := LEFTBOUND;
          Y := UPBOUND;
        END
      ELSE
      BEGIN
        Y := Y + 1;
        X := LEFTBOUND;
      END
    END
  END
ELSE
  BEGIN (7)
    Y := Y + 1;
    X := LEFTBOUND;
  END; (7)

(* start new page *)
PAGEOUT : BEGIN (8)
  BLANKLINES (21,3,21);

  (* check if satisfied with current page *)
  WRITE (' Page ', PAGENUM, ' Okay? Y/N : ');
  IF GETCHAR ('y','n','Y','N'),
    TRUE,TRUE,TRUE) IN ('y','Y') THEN
  BEGIN (9)

    (* write current page out to disk *)
    CODESCREEN (FALSE);

    (* clear the screen and begin new page editing *)
    PAGE (OUTPUT);
    PAGENUM := PAGENUM + 1;

    (* reinitialize the screen buffer to all blanks *)
    FILLCHAR (SCREEN(0), SCREENBYTES, ' ');
    X := LEFTBOUND;
    Y := UPBOUND;
  END; (9)
END; (8)

END; (* cases *)

(* if character typed was a visible character *)
IF (CHARCODE >= 32) AND (CHARCODE <= 126) THEN
  BEGIN (10)

    (* if last character exceeded screen boundaries *)
    IF (X >= RIGHT) AND ((Y >= LOBOUND) OR (MORE AND (Y >= 1)))
    THEN
      SQUAWK

```

```

ELSE
BEGIN (11)

    (* save the character in the screen buffer *)
    IF MORE THEN SCREEN(X,Y+20) := SCREENCHAR
    ELSE
    SCREEN(X,Y) := SCREENCHAR;

    (* move cursor over one *)
    X := X + 1;

    (* check auto wrap around *)
    IF X > RIGHT THEN
    BEGIN (12)
        IF Y < LOBOUND THEN
        BEGIN (13)
            X := LEFTBOUND;
            Y := Y + 1;
        END (13)
        ELSE
            X := X - 1;
        END; (12)
    END; (11)
END; (10)

(* until control-c pressed *)
UNTIL (CHARCODE = ETX) ;

END; (* fillscreenbuffer *)

(-----)

(* select the answer type *)
SEGMENT PROCEDURE SELECTATYPE;
VAR LBOUND,
    HBOUND,
    SELECT : CHAR;
    ERR : BOOLEAN;
    I : INTEGER;

(.....)

(* get the answer bounds *)
PROCEDURE GETABOUND;
BEGIN
    ERR := FALSE;
    REPEAT
        PAGE(OUTPUT);
        GOTOXY(22,0);
        WRITE('ENTER ANSWER SELECTION RANGE');
        GOTOXY(0,3);
        WRITE('Low bound? (letter/digit) : ');
        LBOUND := GETCHAR(['0'..'9','A'..'Z'],TRUE,TRUE,TRUE);
        WRITELN;
        WRITE('High bound? (letter/digit) : ');
        HBOUND := GETCHAR(['0'..'9','A'..'Z'],TRUE,TRUE,TRUE);
        ERR := FALSE;
        IF (HBOUND IN ['0'..'9']) THEN (a)
            IF NOT (LBOUND IN ['0'..'9']) THEN (b)
                ERR := TRUE;
        IF (HBOUND IN ['A'..'Z']) THEN (c)
            IF NOT (LBOUND IN ['A'..'Z']) THEN (d)
                ERR := TRUE;
        IF ERR THEN (e)
            BEGIN (1)
                WRITELN;
                WRITELN;
                WRITELN('Bounds range type mismatch error!');
                SQUAWK;
                WRITELN;
                STALL;
            END;
    UNTIL ERR = FALSE;
END;

```

```

END; (1)

IF (ORD(LBOUND) > ORD(HBOUND)) AND (NOT ERR) THEN (f)
BEGIN (2)
  WRITELN;
  WRITELN;
  WRITELN('Low bound exceeds high bound error!');
  SQUAWK;
  WRITELN;
  STALL;
  ERR := TRUE;
END; (2)
UNTIL NOT ERR;
ITEMINFO.HIGHANSWER := HBOUND;
ITEMINFO.LOWANSWER := LBOUND;
END; (* getabound *)

(.....)

BEGIN (* selectatype *)
  PAGE(OUTPUT);
  GOTOXY(20,0);
  WRITE('SELECT ANSWER TYPE');
  GOTOXY(0,4);
  WRITE('Select one of the following options by entering its number. ');
  GOTOXY(16,8);
  WRITE('1. MULTIPLE CHOICE/SINGLE ANSWER');
  GOTOXY(16,9);
  WRITE('2. INTEGER VALUE ANSWER');
  GOTOXY(16,10);
  WRITE('3. MULTIPLE CHOICE/MULTIPLE ANSWERS');
  GOTOXY(16,14);
  WRITE('Enter Choice # : ');
  SELECT := GETCHAR(['1'..'3'], TRUE, TRUE, TRUE);
  IF SELECT <> '2' THEN GETABOUND;

  PAGE(OUTPUT);
  CASE SELECT OF
    '1' : BEGIN (1)
      GOTOXY(20,0);
      WRITE('ENTER MULTIPLE CHOICE/SINGLE ANSWER');
      GOTOXY(0,3);
      WRITELN('The answer range is : ', ITEMINFO.LOWANSWER, '..',
        ITEMINFO.HIGHANSWER);
      WRITELN;
      ITEMINFO.ATYPE := CHARVALUE;
      GOTOXY(0,6);
      WRITE('Enter answer and then press <RET> : ');
      FILLBUF(1, [ITEMINFO.LOWANSWER..ITEMINFO.HIGHANSWER],
        TRUE);
      ITEMINFO.ANSWER := LINEBUF(0);
      LINEBUF(0) := ' ';
    END; (1)
    '2' : BEGIN (2)
      GOTOXY(20,0);
      WRITE('ENTER INTEGER VALUE ANSWER');
      ITEMINFO.ATYPE := INTVALUE;
      GOTOXY(0,6);
      WRITE('Enter answer (integer '
        'value) and then press <RET> : ');
      READLN(1);
      ITEMINFO.INTANSWER := 1;
    END; (2)
    '3' : BEGIN (3)
      GOTOXY(20,0);
      WRITE('ENTER MULTIPLE CHOICE/MULTIPLE ANSWERS');
      GOTOXY(0,3);
      WRITELN('The answer range is : ', ITEMINFO.LOWANSWER, '..',
        ITEMINFO.HIGHANSWER);
      ITEMINFO.ATYPE := SEVENCHR;
      GOTOXY(0,6);
      WRITE('Enter the number of answers',
        ' this question has (1..7) : ');
    END; (3)
  END;
END;

```

```

SELECT := GETCHAR(['1'..'7'],TRUE,TRUE,TRUE);
ITEMINFO.ANSWERCOUNT := ORD(SELECT) - 48;
Writeln;
Writeln;
FOR I := 1 TO ITEMINFO.ANSWERCOUNT DO
BEGIN (4)
  WRITE('Enter answer ',I,' , then press <RET> : ');
  FILLBUF(1,
    [ITEMINFO.LOWANSWER..ITEMINFO.HIGHANSWER],
    TRUE);
  ITEMINFO.CHANSWER[I] := LINEBUF[0];
  LINEBUF[0] := ' ';
  Writeln;
END; (4)
END; (3)
END; (* case *)

END; (* selectatype *)

(-----)

(* gets question data and text and puts into file *)
SEGMENT PROCEDURE INSERTITEM;
VAR OPENSLOT,
    HASHLOC,
    CODENUM,
    SLOT : INTEGER;
    DONE,
    CODEOK : BOOLEAN;

(.....)

(* get data for items *)
PROCEDURE GETITEMDATA;
BEGIN (* get item data *)
  SELECTATYPE;
  (* get item parameters *)
  PAGE(OUTPUT);
  GETPARAM('A');
  GETPARAM('B');
  GETPARAM('C');
  WITH ITEMINFO DO
  BEGIN (1)
    A := AVALUE;
    B := BVALUE;
    C := CVALUE;
  END; (1)
END; (* get item data *)

(-----)

(* verify the data *)
PROCEDURE VERIFYDATA;
VAR SELECT : CHAR;
BEGIN
  REPEAT
    PAGE(OUTPUT);
    GOTOXY(20,0);
    WRITE('VERIFY QUESTION DATA MENU');
    GOTOXY(0,4);
    WRITE('Select one of the following options by entering its number. ');
    GOTOXY(0,6);
    WRITE('Current data : ');
    GOTOXY(15,6);
    WRITE('A parameter = ',ITEMINFO.A:5:3);
    GOTOXY(15,7);
    WRITE('B parameter = ',ITEMINFO.B:5:3);
    GOTOXY(15,8);
    WRITE('C parameter = ',ITEMINFO.C:5:3);
    GOTOXY(16,12);
    WRITE('1. QUIT (data ok)');
    GOTOXY(16,13);
    WRITE('2. CHANGE PARAMETER A');

```

```

GOTOXY(16,14);
WRITE('3. CHANGE PARAMETER B');
GOTOXY(16,15);
WRITE('4. CHANGE PARAMETER C');
GOTOXY(16,18);
WRITE('Enter Choice # : ');
SELECT := GETCHAR(['1'..'4'],TRUE,TRUE,TRUE);
CASE SELECT OF
  '1' : ;
  '2' : BEGIN (1)
          GETPARAM('A');
          ITEMINFO.A := AVALUE;
        END; (1)
  '3' : BEGIN (2)
          GETPARAM('B');
          ITEMINFO.B := BVALUE;
        END; (2)
  '4' : BEGIN (3)
          GETPARAM('C');
          ITEMINFO.C := CVALUE;
        END; (3)
END; (* cases *)
UNTIL SELECT = '1';
END; (* verify data *)

[.....]

BEGIN (* insertitem *)

  (* look for free slot in directory *)
  OPENSLOT := ITEMFREESLOT;

  (* if no room in subtest directory *)
  IF OPENSLOT < 0 THEN
    BEGIN (1)
      PAGE(OUTPUT);
      WRITELN;
      WRITELN('No room to add question !! ');
      WRITELN;
      STALL;
      EXIT(INSTRTITEM);
    END; (1)

  (* get question code # *)
  PAGE(OUTPUT);
  CODEOK := FALSE;
  WRITELN;
  REPEAT
    WRITE('Enter the question code #, then press <RET> : ');
    (*$1~*)
    READLN(CODENUM);
    (*$1+*)

    (* if valid code #, >= 0 *)
    IF CODENUM >= 0 THEN
      BEGIN (2)

        (* check if code # previously used in this subtest *)
        SLOT := SLOTSEARCH(CODENUM);
        IF SLOT <> NIL THEN
          BEGIN (3)
            WRITELN;
            WRITELN('Code # ',CODENUM,' previously used !');
            WRITELN;
            SQUAWK;
          END (3)
        ELSE
          CODEOK := TRUE;
        END (2)
      ELSE
        EXIT(INSTRTITEM);
    UNTIL CODEOK;

```

```
(* save code number in subtest directory *)
DIRECTORY.ITEMCODE(OPENSLOT) := CODENUM;

(* get ptrs to free space to put question text *)
LOADPTRS;

(* save these ptrs for this question *)
ITEMINFO.ITEMPTR := CURRFREEPTR;
ITEMINFO.ITEMBLOCK := CURRBLOCK;

(* enter in text for the question *)
FILLSCREENBUFFER(TOPMAX,RIGHTMAX,
                 BOTTOMMAX,LEFTMAX,TRUE);

(* set graphics flag *)
ITEMINFO.GRAPHICS := FALSE;

TEXT80MODE;

(* set the graphics flag *)
SETGFLAG;

(* get the data for the question *)
GETITEMDATA;

(* verify the data *)
VERIFYDATA;

(* write the screen buffer to block buffer to ascii file *)
CODESCREEN(TRUE);

(* update the new location of free space to put text *)
SAVEPTRS;

(* update the subtest directory to disk *)
UPDATEDIRECTORY(CURRINDEXRECNUM);

(* update count of items for this subtest *)
DIRINFO(CURRINDEXRECNUM).ITEMCOUNT :=
    DIRINFO(CURRINDEXRECNUM).ITEMCOUNT + 1;

(* find the location to put the question data *)
HASHLOC := HASH(OPENSLOT);

(* write the record to disk *)
UPDATEITEMFILE(HASHLOC);
END; (* insert item *)
```

```

(*)
(*)
(*)      Textfile : TMGR.DIR/T.10.TEXT      Volume : TFILES      (*)
(*)      Codefile : T.MGR.CODE ('Include' file) Volume : CATDATA (*)
(*)
(*)
(*) File last modified : Feb 18, 1983      NPRDC      (*)
(*)

```

(\* writes the item ascii buffer to diskfile \*)

```

PROCEDURE WRITEITEMBLOCK;
VAR BLOCKSTRANSFERRED : INTEGER;
    BADIO : BOOLEAN;
BEGIN
    BADIO := FALSE;
    RESET(ITEMTEXT, TEXTNAME);
    BLOCKSTRANSFERRED := BLOCKWRITE(ITEMTEXT, TRIX.ASCIIBUF, 4, WHICHBLOCK);
    BADIO := ((BLOCKSTRANSFERRED < 4) OR (IORESULT <> 0));
    CLOSE(ITEMTEXT, LOCK);
    IF BADIO THEN
        BEGIN (1)
            WRITELN; WRITELN;
            WRITE(' Block ', WHICHBLOCK, ' write io error. ');
            WRITELN;
            WRITELN(' Possibly no room to expand ', TEXTNAME);
            WRITELN(' Must have unused space at end of file ');
            WRITELN(' or put file at end of directory. ');
            WRITELN;
            STALL;
            EXIT(PROGRAM);
        END; (1)
    END; (* writeitemblock *)

```

(-----)

(\* reads a block from disk into the item ascii buffer \*)

```

PROCEDURE READITEMBLOCK;
VAR BLOCKSTRANSFERRED : INTEGER;
    BADIO : BOOLEAN;
BEGIN
    BADIO := FALSE;
    RESET(ITEMTEXT, TEXTNAME);
    BLOCKSTRANSFERRED := BLOCKREAD(ITEMTEXT, TRIX.ASCIIBUF, 4, WHICHBLOCK);
    BADIO := ((BLOCKSTRANSFERRED < 4) OR (IORESULT <> 0));
    CLOSE(ITEMTEXT, LOCK);
    IF BADIO THEN
        BEGIN (1)
            WRITELN; WRITELN;
            WRITE(' Block ', WHICHBLOCK, ' read io error. ');
            WRITELN;
            WRITELN(' Cant read ', TEXTNAME);
            WRITELN;
            STALL;
            EXIT(PROGRAM);
        END; (1)
    END;
END;

```

(-----)

(\* returns the slot # in subtest directory where question is, nil if the  
 (\* question code is not in the directory \*)

```

FUNCTION SLOTSEARCH;
VAR SLOT : INTEGER;
    FOUND : BOOLEAN;
BEGIN
    (* skip space reserved for samples *)
    SLOT := MAXSAMPLES + 1;

    FOUND := FALSE;
    REPEAT
        IF DIRECTORY.ITEMCODE(SLOT) = CODE

```

```

    THEN
        FOUND := TRUE
    ELSE
        SLOT := SLOT + 1;
    UNTIL (SLOT > MAXITEMPOOL) OR (FOUND);
    IF FOUND
    THEN
        SLOTSEARCH := SLOT
    ELSE
        SLOTSEARCH := NIL;
END; (* slot search *)

-----

(* updates test directory *)
PROCEDURE UPDATEDIRECTORY;
BEGIN
    RESET(FILEIRECTORY, INDEXNAME);
    SEEK(FILEIRECTORY, RECNUM);
    FILEIRECTORY^ := DIRECTORY;
    PUT(FILEIRECTORY);
    CLOSE(FILEIRECTORY, LOCK);
END; (* updatedirectory *)

-----

(* updates item data file *)
PROCEDURE UPDATEITEMFILE;
BEGIN
    RESET(FILEITEMINFO, DATANAME);
    SEEK(FILEITEMINFO, RECNUM);
    FILEITEMINFO^ := ITEMINFO;
    PUT(FILEITEMINFO);
    CLOSE(FILEITEMINFO, LOCK);
END; (* updateitemfile *)

-----

(* saves value of free space, block & byte ptr in block 0, bytes 0..3 of text *)
(* file expects the block value to be in CURRBLOCK *)
(* and the byte value to be in CURRFREEPTR. *)
PROCEDURE SAVEPTRS;
VAR TRIAX1 : RECORD CASE INTEGER OF
    1 : (TWOBYTES : PACKED ARRAY
        [0..1] OF CHAR);
    2 : (INTVALUE : INTEGER);
END;
BEGIN
    READITEMBLOCK(0);
    TRIAX1.INTVALUE := CURRBLOCK;
    MOVELEFT(TRIAX1.TWOBYTES(0), TRIAX1.ASCIIBUF(0), 2);
    TRIAX1.INTVALUE := CURRFREEPTR;
    MOVELEFT(TRIAX1.TWOBYTES(0), TRIAX1.ASCIIBUF(2), 2);
    WRITEITEMBLOCK(0);
END; (* save ptrs *)

-----

(* loads block # & byte ptr of free space always the end of the last text *)
(* entered puts the free block number in CURRBLOCK and byte # in CURRFREEPTR. *)
PROCEDURE LOADPTRS;
VAR TRIAX1 : RECORD CASE INTEGER OF
    1 : (TWOBYTES : PACKED ARRAY[0..1] OF CHAR);
    2 : (INTVALUE : INTEGER);
END;
BEGIN
    READITEMBLOCK(0);
    MOVELEFT(TRIAX1.ASCIIBUF(0), TRIAX1.TWOBYTES(0), 2);
    CURRBLOCK := TRIAX1.INTVALUE;
    MOVELEFT(TRIAX1.ASCIIBUF(2), TRIAX1.TWOBYTES(0), 2);
    CURRFREEPTR := TRIAX1.INTVALUE;
END; (* load ptrs *)

```

```
(*****)
(*)
(*)      Textfile : TMGR.DIR/T.GET1.TEXT      Volume : TFILES      *)
(*)      Codefile : T.MGR.CODE ('Include' file) Volume : CATDATA    *)
(*)*****)
(*) File last modified : May 20, 1983      NPRDC      *)
(*)*****)
```

(\* list item text and/or item parameters \*)  
 SEGMENT PROCEDURE LISTITEMS;

```
TYPE DINFO = RECORD
    ICODE,
    ISLOT : INTEGER;
END;
```

```
VAR BYTECNT,
    BLKCNT,
    SAVENUM,
    STARTNUM,
    STOPNUM,
    SLOTNUM,
    SCREENBYTES,
    BLK,
    BLKPTR,
    I,
    K,
    WASTETIME,
    DATASLOT : INTEGER;
```

```
BREAKFILE,
TOFILE,
DONELIST,
CONSOLE,
CONTINUE,
COMPLETE,
LISTTEXT : BOOLEAN;
```

```
SELECT,
OPT,
COMMAND,
LCOMMAND : CHAR;
```

```
A : ARRAY[0..294] OF DINFO;
```

```
(.....)
```

```
(* sort the directory *)
PROCEDURE QUICKSORT;
VAR B : INTEGER;
```

```
(.....)
```

```
PROCEDURE SORT(L,R : INTEGER);
VAR I,J : INTEGER;
    X,W : DINFO;
BEGIN (* sort *)
    write('.');
    I := L;
    J := R;
    X := A[(L+R) DIV 2];
    REPEAT
        WHILE A[I].ICODE < X.ICODE DO I := I + 1;
        WHILE X.ICODE < A[J].ICODE DO J := J - 1;
        IF I <= J THEN
            BEGIN (1)
                W := A[I];
                A[I] := A[J];
                A[J] := W;
                I := I + 1;
                J := J - 1;
            END
        END
    UNTIL I > J;
    SORT(L,I-1);
    SORT(I+1,R);
END;
```

```

        END; (1)
        UNTIL I > J;
        IF L < J THEN SORT(L,J);
        IF I < R THEN SORT(I,R);
    END; (* sort *)

{.....}

BEGIN (* quicksort *)
    FOR B := 0 TO 294 DO
        BEGIN (1)
            A(B).ICODE := DIRECTORY.ITEMCODE(B+6);
            A(B).ISLOT := B+6;
        END; (1)
    SORT(0,294);
END; (* quicksort *)

{-----}

(* reads item text file & displays item text to printer or file *)
PROCEDURE LISTPRINT(BLOCKNUM, BLOCKPTR : INTEGER);
VAR X,
    Y,
    OLDY,
    CURRPTR,
    CURRBLK,
    SCREENBYTES,
    CHARCODE,
    SKIPBYTE : INTEGER;

{.....}

(* returns next code in file *)
FUNCTION LBUFCODE : INTEGER;
BEGIN
    LBUFCODE := TRIX.ASCIIBUF(CURRPTR);
    CURRPTR := CURRPTR + 1;
    IF CURRPTR > 2047 THEN
        BEGIN (1)
            CURRBLK := CURRBLK + 4;
            READITEMBLOCK(CURRBLK);
            CURRPTR := 0;
        END; (1)
    END; (* lbufcode *)

{.....}

BEGIN (* listprint *)
    SCREENBYTES := (XSCREEN + 1) * (YSCREEN + 1);
    FILLCHAR(SCREEN(0),SCREENBYTES,' ');
    OLDY := TOPMAX;
    READITEMBLOCK(BLOCKNUM);
    CURRPTR := BLOCKPTR;
    CURRBLK := BLOCKNUM;
    REPEAT
        CHARCODE := LBUFCODE;
        CASE CHARCODE OF
            GOTOFLAG : BEGIN (1)
                X := LBUFCODE;
                Y := LBUFCODE;
                (* ignore next byte, due to a file modification *)
                SKIPBYTE := LBUFCODE;

                (*
                WHILE OLDY < Y DO
                BEGIN (2)
                    *)
                    WRITELN(DEST);
                    (*
                    OLDY := OLDY + 1;
                END; (2)
                *)
                WRITE(DEST, ' ' : X);

```

```

        END; (1)
PAGEFLAG : BEGIN (3)
        Writeln(Dest);
        Writeln(Dest);
        Writeln(Dest);
        OldY := TOPMAX;
        END; (3)
ENDITEM : ;
END; (* cases *)
IF (CHARCODE >= 32) AND (CHARCODE <= 126) THEN
BEGIN (4)
    SCREEN[X,Y] := CHR(CHARCODE);
    X := X + 1;
    WRITE(DEST,CHR(CHARCODE));
    BYTECNT := BYTECNT + 1;
END; (4)
UNTIL CHARCODE = ENDITEM;
END; (* print *)

{-----}

(* lists things to the console *)
PROCEDURE LCONSOLE;
VAR FIXCHAR : CHAR;
    GRAF : BOOLEAN;
BEGIN
    IF LISTTEXT THEN
    BEGIN (1)
        GRAF := FALSE;
        IF ITEMINFO.GRAPHICS THEN
        BEGIN (2)
            FILLPORT;
            GOODECODEPRINT(CURRINDEXRECNUM,A[ SLOTNUM ].ICODE);
            PAGE(OUTPUT);
            GRAF := TRUE;
        END (2)
        ELSE
            DECODEPRINT(BLK,BLKPTR);
            GOTOXY(0,20);GOTOXY(20,23);
            IF SLOTNUM > MAXSAMPLES THEN
            BEGIN (3)
                IF NOT GRAF THEN
                BEGIN (4)
                    IF PCRECNUM THEN GOTOXY(0,23)
                    ELSE GOTOXY(0,20);
                    WRITE('Item code : ',A[ SLOTNUM ].ICODE);
                    IF PCRECNUM THEN GOTOXY(20,23)
                    ELSE GOTOXY(0,21);
                    WRITE('Answer : ');
                    IF PCRECNUM THEN
                    CASE ITEMINFO.ATYPE OF
                        CHARVALUE : WRITE(' ',ITEMINFO.ANSWER);
                        INTVALUE : WRITE(' ',ITEMINFO.INTANSWER);
                        SEVENCHR : BEGIN
                            FOR I := 1 TO ITEMINFO.ANSWERCOUNT DO
                                WRITE(' ',ITEMINFO.CHRANSWER[I]);
                            END;
                        END;
                    END (* cases *)
                    ELSE
                    CASE ITEMINFO.ATYPE OF
                        CHARVALUE : Writeln(' ',ITEMINFO.ANSWER);
                        INTVALUE : Writeln(' ',ITEMINFO.INTANSWER);
                        SEVENCHR : BEGIN
                            FOR I := 1 TO ITEMINFO.ANSWERCOUNT DO
                                WRITE(' ',ITEMINFO.CHRANSWER[I]);
                                Writeln;
                            END;
                        END;
                    END; (* cases *)
                    IF PCRECNUM THEN GOTOXY(32,23)
                    ELSE GOTOXY(0,23);
                    WRITE('Press <RET> to continue, <ESC> to quit ');
                    IF GETCHAR([CHR(RET),CHR(ESC)],TRUE,TRUE,TRUE) = CHR(ESC) THEN
                    BEGIN (5)

```

```

        CLOSE(FILEITEMINFO,LOCK);
        EXIT(LISTITEMS);
    END; (5)
END (4)
ELSE
    BEGIN (6)
        GGOTOXY(0,20);
        GWRITESTR('Item code : ');
        GWRITEINT(A(SLOTNUM).ICODE);
        GGOTOXY(0,21);
        GWRITESTR('Answer : ');
        CASE ITEMINFO.ATYPE OF
            CHARVALUE : GWRITECHR(ITEMINFO.ANSWER);
            INTVALUE  : GWRITEINT(ITEMINFO.INTANSWER);
            SEVENCHR  : BEGIN
                            FOR I := 1 TO ITEMINFO.ANSWERCOUNT DO
                                BEGIN
                                    GWRITECHR(ITEMINFO.CHANSWER(I));
                                    GWRITECHR(' ');
                                END;
                            END;
        END; (* case *)

        GGOTOXY(0,23);
        GWRITESTR('Press <RET> to continue, <ESC> to quit ');
        IF GETCHAR([CHR(RET),CHR(ESC)],TRUE,TRUE,TRUE) = CHR(ESC) THEN
            BEGIN (7)
                TEXTON;
                CLOSE(FILEITEMINFO,LOCK);
                EXIT(LISTITEMS);
            END; (7)
            TEXTON;
        END; (6)
    END (3)
ELSE
    GSTALL;
END (1)
ELSE
    BEGIN (8)
        K := K + 1;
        WRITE(A(SLOTNUM).ICODE : 7,
              ITEMINFO.A : 18 :5,
              ITEMINFO.B : 12 :5,
              ITEMINFO.C : 11 :5);
        write(' ');
        IF ITEMINFO.GRAPHICS THEN
            WRITE(' on ')
        ELSE
            WRITE(' off');

        if ITEMINFO.DUMMY1 = 1.0 THEN
            WRITELN(' yes')
        ELSE
            WRITELN(' no');

        IF K > 18 THEN
            BEGIN (9)
                WRITELN;
                STALL;
                K := 0;
                PAGE(OUTPUT);
                WRITELN;
                WRITELN(
' Item code      A          B          C          graphics krunched');
                WRITELN;
            END; (9)
        END; (8)
    END; (* lconsole *)

    (-----)

    (* lists item text and data to file/printer *)
    PROCEDURE LFILE;

```

```

BEGIN
  IF LISTTEXT THEN
    BEGIN (1)
      IF SLOTNUM > MAXSAMPLES THEN
        BEGIN (2)
          WRITELN(DEST, ' Item code : ', A(SLOTNUM).ICODE);
          WRITELN(DEST);
          WRITELN(DEST, ' A parameter : ', ITEMINFO.A);
          WRITELN(DEST, ' B parameter : ', ITEMINFO.B);
          WRITELN(DEST, ' C parameter : ', ITEMINFO.C);
        END; (2)
        LISTPRINT(BLK, BLKPTR);
        WRITELN(DEST);
        WRITELN(DEST);
        IF SLOTNUM > MAXSAMPLES THEN
          BEGIN (3)
            WRITE(DEST, ' Answer(s) : ');
            CASE ITEMINFO.ATYPE OF
              CHARVALUE : WRITELN(DEST, ITEMINFO.ANSWER);
              INTVALUE  : WRITELN(DEST, ITEMINFO.INTANSWER);
              SEVENCHR  : BEGIN (4)
                            FOR I := 1 TO ITEMINFO.ANSWERCOUNT DO
                              WRITE(DEST, ITEMINFO.CHANSWER[I], ' ');
                              WRITELN(DEST);
                            END; (4)
            END; (* cases *)
            WRITELN(DEST);
          END; (3)
          FOR I := 1 TO 80 DO
            WRITE(DEST, '-');
            WRITELN(DEST); WRITELN(DEST);
            BYTECNT := BYTECNT + 150;
          END; (1)
        ELSE
          BEGIN (5)
            WRITE(DEST, A(SLOTNUM).ICODE : 6,
              ITEMINFO.A : 10 : 4,
              ITEMINFO.B : 10 : 4,
              ITEMINFO.C : 10 : 4);

            IF ITEMINFO.GRAPHICS THEN
              WRITE(dest, '      on ');
            ELSE
              WRITE(dest, '      off');

            if ITEMINFO.DUMMY1 = 1.0 THEN
              WRITELN(dest, '      yes')
            ELSE
              WRITELN(dest, '      no');
          END; (5)
        END; (* ifile *)

        -----)

PROCEDURE GETLISTINFO;
BEGIN
  PAGE(OUTPUT);
  GOTOXY(0,4);
  WRITE('Select one of the following options by entering its number. ');
  GOTOXY(16,8);
  WRITE('1. QUIT');
  GOTOXY(16,9);
  WRITE('2. COMPLETE LISTING');
  GOTOXY(16,10);
  WRITE('3. PARTIAL LISTING');
  GOTOXY(16,18);
  WRITE('Enter Choice # : ');
  OPT := GETCHAR(['1'..'3'], TRUE, TRUE, TRUE);
  CASE OPT OF
    '1' : EXIT(LISTITEMS);
    '2' : COMPLETE := TRUE;
    '3' : COMPLETE := FALSE;
  END;

```

```

IF NOT COMPLETE THEN
BEGIN (1)
  PAGE(OUTPUT);
  GOTOXY(20,0);
  WRITE('ENTER RANGE OF ITEMCODES TO LIST');
  WRITELN;
  WRITELN;
  WRITE('List all items between itemcode : ');
  READLN(STARTNUM);
  WRITELN;
  WRITE('And itemcode : ');
  READLN(STOPNUM);
  IF STARTNUM > STOPNUM THEN
  BEGIN (2)
    SAVENUM := STARTNUM;
    STARTNUM := STOPNUM;
    STOPNUM := SAVENUM;
  END; (2)
END; (1)

PAGE(OUTPUT);
GOTOXY(20,0);
WRITE('OUTPUT SELECT MENU');
GOTOXY(0,4);
WRITE('Select one of the following options by entering its number. ');
GOTOXY(16,8);
WRITE('1. QUIT');
GOTOXY(16,9);
WRITE('2. TEXT TO CONSOLE');
GOTOXY(16,10);
WRITE('3. DATA TO CONSOLE');
GOTOXY(16,11);
WRITE('4. TEXT TO PRINTER');
GOTOXY(16,12);
WRITE('5. DATA TO PRINTER');
GOTOXY(16,13);
WRITE('6. TEXT TO FILE');
GOTOXY(16,14);
WRITE('7. DATA TO FILE');
GOTOXY(16,18);
WRITE('Enter Choice # : ');
SELECT := GETCHAR(['1'..'7'],TRUE,TRUE,TRUE);
CONSOLE := FALSE;
LISTTEXT := TRUE;
IF SELECT = '1' THEN
begin
  updatedirectory(currindexrecnum);
  EXIT(LISTITEMS);
end;
END; (* get listinfo *)

```

(.....)

```

BEGIN (* listitems *)
  GETLISTINFO;
  PAGE(OUTPUT);
  WRITE('Please wait');
  QUICKSORT;
  TOFILE := FALSE;
  CASE SELECT OF
    '1' : ;
    '2' : CONSOLE := TRUE;
    '3' : BEGIN (1)
      CONSOLE := TRUE;
      LISTTEXT := FALSE;
      END; (1)
    '4' : REWRITE(DEST,UNITNUMPRINTER);
    '5' : BEGIN (2)
      REWRITE(DEST,UNITNUMPRINTER);
      LISTTEXT := FALSE;
      END; (2)
    '6' : BEGIN

```

```

        GETNEWFILE;
        PAGE(OUTPUT);
        WRITE('Do you want to break the files up? Y/N ');
        IF GETCHAR(['Y','N','y','n'],TRUE,TRUE,TRUE) IN ['Y','y'] THEN
            BREAKFILE := TRUE;
        ELSE
            BREAKFILE := FALSE;
        END;
    '7' : BEGIN (3)
        LISTTEXT := FALSE;
        GETNEWFILE;
    END; (3)
END;

IF SELECT IN ['6','7'] THEN
BEGIN (4)
    TOFILE := TRUE;
    PAGE(OUTPUT);
    WRITE('Writing to file. ');
END; (4)

IF NOT CONSOLE THEN
BEGIN (5)
    WRITELN(DEST);
    FOR I := 1 TO 80 DO
        WRITE(DEST,'*');
    WRITELN(DEST);
    WRITELN(DEST,DIRECTORY.TESTNAME);
    FOR I := 1 TO 80 DO
        WRITE(DEST,'*');
    WRITELN(DEST);WRITELN(DEST);
END; (5)

RESET(FILEITEMINFO,DATANAME);
K := 0;
IF NOT LISTTEXT THEN
BEGIN (6)
    IF CONSOLE THEN
    BEGIN (7)
        PAGE(OUTPUT);
        WRITELN(
            ' Item code      A      B      C      graphics krunched');
        WRITELN;
    END (7)
    ELSE
    BEGIN (8)
        WRITELN(DEST,
            ' Item code A      B      C      graphics krunched');
        WRITELN(DEST);
    END; (8)
END; (6)

PCRENUM := (CURRINDEXRECNUM-4) OR (CURRINDEXRECNUM-6);
SLOTNUM := 0;
BYTECNT := 0;
BLKCNT := 4;
DONELIST := FALSE;
REPEAT
    CONTINUE := TRUE;
    IF NOT COMPLETE THEN
        IF (A(SLOTNUM).ICODE < STARTNUM) THEN
            CONTINUE := FALSE;

    IF NOT COMPLETE THEN
        IF (A(SLOTNUM).ICODE > STOPNUM) THEN
            BEGIN (9)
                CONTINUE := FALSE;
                DONELIST := TRUE;
            END; (9)

    IF (A(SLOTNUM).ICODE >= 0) AND (CONTINUE) THEN
        BEGIN (10)
            IF SELECT IN ['6','7'] THEN

```

```

        WRITE(' ');
        DATASLOT := HASH(A[SLOTNUM].ISLOT);
        SEEK(FILEITEMINFO,DATASLOT);
        GET(FILEITEMINFO);
        ITEMINFO := FILEITEMINFO^;
        BLK := ITEMINFO.ITEMBLOCK;
        BLKPTR := ITEMINFO.ITEMPTR;
        IF CONSOLE THEN
            LCONSOLE
        ELSE
            LFILE;

        IF BYTECNT > 512 THEN
            BEGIN
                BLKCNT := BLKCNT + 1;
                BYTECNT := BYTECNT MOD 512;
            END;

        IF (BREAKFILE) AND (BLKCNT >= 30) AND (LISTTEXT) AND (TOFILE) THEN
            BEGIN
                CLOSE(DEST,LOCK);
                GETNEWFILE;
                BLKCNT := 4;
                BYTECNT := 0;
            END;
        END; (10)
        SLOTNUM := SLOTNUM + 1;

    UNTIL (SLOTNUM > 294) OR DONELIST;

    IF NOT (CONSOLE) THEN
        CLOSE(DEST,LOCK)
    ELSE
        IF (NOT LISTTEXT) AND (K <> 0) THEN
            BEGIN (11)
                WRITELN;
                STALL;
            END; (11)
        CLOSE(FILEITEMINFO,LOCK);
    END; (* listitems *)

```

```

(*****)
(*)                                     (*)
(*)   Textfile : TMGR.DIR/T.GET2.TEXT   Volume : TFILES   (*)
(*)   Codefile : T.MGR.CODE ('Include' file) Volume : CATDATA (*)
(*)                                     (*)
(*****)
(*) File last modified : May 25, 1983   NPRDC   (*)
(*****)

```

(\* get test item/display text/data, allow changes \*)

SEGMENT PROCEDURE FETCHITEM;

VAR DATASLOT,

SLOT,

BLOCK,

BLOCKPTR,

CODENUM : INTEGER;

CODEOK : BOOLEAN;

COMMAND : CHAR;

{.....}

(\* display fetch item menu \*)

PROCEDURE ITEMMENU;

BEGIN

TEXT80MODE;

NORMAL;

GOTOXY(20,0);

WRITE('FETCH ITEM MENU');

GOTOXY(0,4);

WRITE('Select one of the following options by entering its number.');

GOTOXY(0,6);

WRITE('Currently managing question : ',CODENUM);

GOTOXY(16,10);

WRITE('1. QUIT');

GOTOXY(16,11);

WRITE('2. DISPLAY QUESTION TEXT');

GOTOXY(16,12);

WRITE('3. DISPLAY QUESTION DATA');

GOTOXY(16,13);

WRITE('4. MODIFY QUESTION');

GOTOXY(16,14);

WRITE('5. DELETE QUESTION');

GOTOXY(16,15);

WRITE('6. SET GRAPHICS FLAG');

GOTOXY(16,18);

WRITE('Enter Choice # : ');

END; (\* itemmenu \*)

{-----}

PROCEDURE SHOWINFO;

VAR I : INTEGER;

BEGIN

TEXT80MODE;

GOTOXY(22,0);

WRITE('QUESTION DATA');

(\* display item data \*)

GOTOXY(0,3);

WRITE('A Parameter : ',ITEMINFO.A:5:3);

WRITE('B Parameter : ',ITEMINFO.B:5:3);

WRITE('C Parameter : ',ITEMINFO.C:5:3);

(\* show answer range and answer \*)

WRITE('Answer type : ');

CASE ITEMINFO.ATYPE OF

CHARVALUE : WRITE('MULTIPLE CHOICE/SINGLE ANSWER');

INTVALUE : WRITE('INTEGER VALUE ANSWER');

SEVENCHR : WRITE('MULTIPLE CHOICE/MULTIPLE ANSWER [' ,

ITEMINFO.ANSWERCOUNT,' answers]');

END; (\* cases \*)

IF ITEMINFO.ATYPE <> INTVALUE THEN

WRITE('Answer range : ',ITEMINFO.LOWANSWER,

'..', ITEMINFO.HIGHANSWER);

WRITE('Answer : ');

```

CASE ITEMINFO.ATYPE OF
  CHARVALUE : WRITELN(ITEMINFO.ANSWER);
  INTVALUE  : WRITELN(ITEMINFO.INTANSWER);
  SEVENCHR  : BEGIN (1)
                FOR I := 1 TO ITEMINFO.ANSWERCOUNT DO
                  WRITE(ITEMINFO.CHANSWER(I),' ');
                WRITELN;
              END; (1)
END; (* cases *)
WRITE('Graphics Flag : ');
IF NOT ITEMINFO.GRAPHICS THEN
  WRITELN('OFF')
ELSE
  IF ITEMINFO.DUMMY1 = COMPRESSED THEN
    WRITELN('COMPRESSED ON')
  ELSE
    WRITELN('FOTOFIL ON');
  WRITELN('Block which text begins : ',ITEMINFO.ITEMBLOCK);
  WRITELN('Byte in block : ',ITEMINFO.ITEMPTR);
  WRITELN;
  STALL;
END; (* showinfo *)

```

(-----)

```

(* displays item text and data *)
PROCEDURE SHOWITEM;
VAR I : INTEGER;
BEGIN
  IF ITEMINFO.GRAPHICS THEN
    BEGIN (1)
      FILLPORT;
      DECODEPRINT(CURINDEXRECNUM,DIRECTORY.ITEMCODE(SLOT));
      PAGE(OUTPUT);
      GOTOXY(0,20);
      GWRITESTR('Item code : ');
      GWRITEINT(DIRECTORY.ITEMCODE(SLOT));
      GOTOXY(0,21);
      GWRITESTR('Answer : ');
      CASE ITEMINFO.ATYPE OF
        CHARVALUE : GWRITECHR(ITEMINFO.ANSWER);
        INTVALUE  : GWRITEINT(ITEMINFO.INTANSWER);
        SEVENCHR  : BEGIN (2)
                      FOR I := 1 TO ITEMINFO.ANSWERCOUNT DO
                        BEGIN (3)
                          GWRITECHR(ITEMINFO.CHANSWER(I));
                          GWRITECHR(' ');
                        END; (3)
                      END; (2)
      END; (* cases *)
      GOTOXY(0,23);
      GSTALL;
      TEXTON;
    END (1)
  ELSE
    BEGIN (4)
      (* print the text *)
      DECODEPRINT(BLOCK,BLOCKPTR);
      (* show item code *)
      IF PCRECNUM THEN
        GOTOXY(0,23)
      ELSE
        GOTOXY(0,20);
        WRITE('Item code : ',DIRECTORY.ITEMCODE(SLOT));
      IF PCRECNUM THEN
        GOTOXY(25,23)
      ELSE
        GOTOXY(0,21);
    END (4)
  END;

```

```

WRITE('Answer : ');
IF PCRECNUM THEN
CASE ITEMINFO.ATYPE OF
  CHARVALUE : WRITE(ITEMINFO.ANSWER);
  INTVALUE  : WRITE(ITEMINFO.INTANSWER);
  SEVENCHR  : BEGIN (50)
    FOR I := 1 TO ITEMINFO.ANSWERCOUNT DO
      WRITE(ITEMINFO.CHANSWER[I], ' ');
    END; (50)
END (* cases *)
ELSE
CASE ITEMINFO.ATYPE OF
  CHARVALUE : WRITELN(ITEMINFO.ANSWER);
  INTVALUE  : WRITELN(ITEMINFO.INTANSWER);
  SEVENCHR  : BEGIN (51)
    FOR I := 1 TO ITEMINFO.ANSWERCOUNT DO
      WRITE(ITEMINFO.CHANSWER[I], ' ');
    WRITELN;
  END; (51)
END; (* cases *)
GOTOXY(0,23);
IF PCRECNUM THEN
GOTOXY(45,23);
STALL;
END; (4)
END; (* showitem *)

-----

(* delete a question from the directory *)
PROCEDURE DELETEITEM;
VAR I,Z : INTEGER;
BEGIN

  (* verify actions *)
  PAGE(OUTPUT);
  GOTOXY(16,2);
  WRITE('***** WARNING *****');
  WRITELN;
  WRITELN;
  WRITE('You have selected the delete question option. ');
  WRITELN(' This will remove the question ');
  WRITELN(' from the subtest itempool. Are you sure you want to delete ',
    DIRECTORY.ITEMCODE(SLOT), ' ? ');

  GOTOXY(16,8);
  WRITE('Press ''N'' or ''Y'' : ');
  IF GETCHAR(['Y','N','y','n'],TRUE,FALSE,TRUE) IN ['Y','y'] THEN
  BEGIN (1)
    WRITELN;
    WRITELN;

    (* display something happening *)
    WRITE('Deleting');
    FOR I := 1 TO 500 DO
      IF I MOD 50 = 0 THEN WRITE('.');

    (* mark slot as unused *)
    DIRECTORY.ITEMCODE(SLOT) := NIL;

    (* update the directory to file *)
    UPDATEDIRECTORY(CURRINDEXRECNUM);

    Z := DIRINFO(CURRINDEXRECNUM).ITEMCOUNT;
    DIRINFO(CURRINDEXRECNUM).ITEMCOUNT := Z - 1;

    PAGE(OUTPUT);
    GOTOXY(17,0);
    WRITELN('***** IMPORTANT *****');
    WRITELN;
    WRITELN(
'Since you have deleted a question from the subtest database, this may ');
    WRITELN(

```

```
'affect the strategy database structures. The strategy database may contain');
  WRITELN(
' the item just deleted and if so, errors may occur during test administration');
  WRITELN(
' when the strategy selects a question not in the itempool. Thus to make sure');
  WRITELN(
' your strategy data is still OK, you should run the ''Verify'' option for');
  WRITELN(
' each strategy data structure this subtest has. ');
  WRITELN;
  WRITELN;
  STALL;
  EXIT(FETCHITEM);
END; (1)
END; (* delete *)
```

(-----)

```
(* modify different things about a question *)
PROCEDURE MODIFYITEM;
VAR COMMAND : CHAR;
```

(.....)

```
(* display option menu *)
PROCEDURE MODMENU;
BEGIN
  TEXT80MODE;
  NORMAL;
  GOTOXY(20,0);
  WRITE('MODIFY QUESTION MENU');
  GOTOXY(0,4);
  WRITE('Select one of the following options by entering its number. ');
  GOTOXY(0,6);
  WRITE('Currently modifying question ', CODENUM);
  GOTOXY(16,10);
  WRITE('1. QUIT');
  GOTOXY(16,11);
  WRITE('2. CHANGE QUESTION CODE');
  GOTOXY(16,12);
  WRITE('3. CHANGE QUESTION TEXT');
  GOTOXY(16,13);
  WRITE('4. CHANGE ANSWER RANGE');
  GOTOXY(16,14);
  WRITE('5. CHANGE ANSWER');
  GOTOXY(16,15);
  WRITE('6. CHANGE QUESTION DATA');
  GOTOXY(16,19);
  WRITE('Enter Choice # : ');
END; (* modmenu *)
```

(-----)

```
(* allows change of id codes *)
PROCEDURE GETNEWID;
VAR NEWID,
    CHECKSLOT : INTEGER;
    CODEOK : BOOLEAN;
BEGIN
  PAGE(OUTPUT);
  WRITELN;
  WRITELN('The current question id code is : ',
    DIRECTORY.ITEMCODE(SLOT));
  CODEOK := FALSE;
  REPEAT (* get code not previously used *)
    WRITELN;
    WRITE('Enter the new identification code and then press <RET> : ');
    READLN(NEWID);
    IF NEWID >= 0 THEN
      BEGIN (1)
        DIRECTORY.ITEMCODE(SLOT) := NIL;
        CHECKSLOT := SLOTSEARCH(NEWID);
        IF CHECKSLOT <> NIL THEN
```

```

        BEGIN (2)
            WRITELN;
            WRITELN('Code # ',NEWID,' previously used !');
            WRITELN;
            SQUAWK;
        END (2)
    ELSE
        CODEOK := TRUE;
    END (1)
ELSE
    BEGIN (3)
        SQUAWK;
        WRITELN;
        WRITELN('Id # must be a positive number.');
```

WRITELN;

END; (3)

```

    UNTIL CODEOK;
    DIRECTORY.ITEMCODE(SLOT) := NEWID;
    WRITELN;
    WRITELN('The new id # is : ',NEWID);
    CODENUM := NEWID;
    WRITELN;
    WRITELN;
    WRITELN;
    WRITELN('          ***** IMPORTANT *****');
    WRITELN;
    WRITELN('Since you have changed the question id code, this may affect the strategy');
    WRITELN('database structures. The strategy database may contain the item just');
    WRITELN('changed and if so, errors may occur during test administration when the');
    WRITELN('strategy selects a question no longer identified by its old id #. Thus to');
    WRITELN('make sure your strategy data is still OK, you should run the ''Verify'' ');
    WRITELN('option for each strategy data structure this subtest has.');
```

WRITELN;

WRITELN;

STALL;

UPDATEDIRECTORY(CURRINDEXRECNUM);

END; (\* getnewid \*)

(-----)

(\* change the question text \*)

```

PROCEDURE CHANGETEXT;
VAR MODPTR,
    MOOBLOCK : INTEGER;
    ENDTXT : BOOLEAN;

    (.....)

(* reads item text file & displays page *)
PROCEDURE PAGEPRINT(VAR LASTPAGE : BOOLEAN);
VAR X,
    Y,
    SCREENBYTES,
    CHARCODE,
    SKIPBYTE : INTEGER;

    (.....)

(* returns next code in item file *)
FUNCTION BUFFERCODE : INTEGER;
BEGIN
    BUFFERCODE := TRIX.ASCII1BUF(MODPTR);
    MODPTR := MODPTR + 1;
    IF MODPTR > 2047 THEN
        BEGIN (1)
            MOOBLOCK := MOOBLOCK + 4;
            READITEMBLOCK(MOOBLOCK);
```

```

        MODPTR := 0;
        END; (1)
        END; (* buffercode *)

        {.....}

        BEGIN (* page print *)
            SCREENBYTES := (XSCREEN + 1) * (YSCREEN + 1);
            FILLCHAR(SCREEN[0], SCREENBYTES, ' ');
            SETSCREEN;
            READITEMBLOCK(MODBLOCK);
            REPEAT
                CHARCODE := BUFFERCODE;
                CASE CHARCODE OF
                    GOTOFLAG : BEGIN (1)
                        X := BUFFERCODE;
                        Y := BUFFERCODE;
                        GOTOXY(X,Y);

                        (* skip next byte, this was an easy way *)
                        (* to get around the modification of the*)
                        (* ascii file, where an extra byte was *)
                        (* used to store the # of characters per*)
                        (* line. *)
                        SKIPBYTE := BUFFERCODE;
                    END; (1)

                    PAGEFLAG : ;
                    ENDITEM : ;
                END; (* cases *)
                IF (CHARCODE >= 32) AND (CHARCODE <= 126) THEN
                    BEGIN (2)
                        SCREEN(X,Y) := CHR(CHARCODE);
                        X := X + 1;
                        WRITE(CHR(CHARCODE));
                    END; (2)
                UNTIL (CHARCODE = ENDITEM) OR (CHARCODE = PAGEFLAG);
                IF CHARCODE = ENDITEM THEN
                    LASTPAGE := TRUE
                ELSE
                    LASTPAGE := FALSE;
            END; (* page print *)

            {.....}

```

```

        BEGIN (* change text *)

            (* get pointers to free space in file *)
            LOADPTRS;

            (* get pointers to text being modified *)
            MODBLOCK := ITEMINFO.ITEMBLOCK;
            MODPTR := ITEMINFO.ITEMPTR;

            (* save ptrs to beginning of new modified text *)
            ITEMINFO.ITEMBLOCK := CURRBLOCK;
            ITEMINFO.ITEMPTR := CURRFREEPTR;

            BLOCK := CURRBLOCK;
            BLOCKPTR := CURRFREEPTR;

            (* change the text page by page, if page is not modified, then *)
            (* write it out as is. *)
            REPEAT

                (* display the text being modified *)
                PAGEPRINT(ENDTEXT);

                (* edit the screen buffer *)
                FILLSCREENBUFFER(TOPMAX,RIGHTMAX,
                                BOTTOMMAX,LEFTMAX,FALSE);

```

```

    (* if it is not the end of the text then write current page *)
    (* to block buffer to file. *)
    IF NOT (ENDTEXT) THEN
        CODESCREEN(FALSE);
    UNTIL ENDTEXT;

    (* write last page to buffer then to file *)
    CODESCREEN(TRUE);

    (* save location of next place to put text *)
    SAVEPTRS;
END; (* changetext *)

(-----)

(* change the answer selection range data *)
PROCEDURE CHANGERANGE;
VAR LBOUND,
    HBOUND : CHAR;
    ERR : BOOLEAN;
BEGIN

    (* display the question *)
    DECODEPRINT(BLOCK,BLOCKPTR);

    (* get new answer range *)
    GOTOXY(0,20);
    WRITELN('Current range : ',ITEMINFO.LOWANSWER,'...',
            ITEMINFO.HIGHANSWER);
    WRITE('New low bound? (letter/digit) : ');
    LBOUND := GETCHAR(['0'..'9','A'..'Z'],TRUE,TRUE,TRUE);
    WRITELN;
    WRITE('New high bound? (letter/digit) : ');
    HBOUND := GETCHAR(['0'..'9','A'..'Z'],TRUE,TRUE,TRUE);
    ERR := FALSE;
    IF (HBOUND IN ['0'..'9']) THEN
        IF NOT (LBOUND IN ['0'..'9']) THEN
            ERR := TRUE;
        IF (HBOUND IN ['A'..'Z']) THEN
            IF NOT (LBOUND IN ['A'..'Z']) THEN
                ERR := TRUE;
        IF ERR THEN
            BEGIN (1)
                BLANKLINES(20,4,20);
                WRITELN('Bounds range type mismatch error!');
                SQUAWK;
                WRITELN;
                STALL;
                EXIT(CHANGERANGE);
            END; (1)

        IF ORD(LBOUND) > ORD(HBOUND) THEN
            BEGIN (2)
                BLANKLINES(20,4,20);
                WRITELN('Low bound exceeds high bound error!');
                SQUAWK;
                WRITELN;
                STALL;
                EXIT(CHANGERANGE);
            END; (2)

        ITEMINFO.HIGHANSWER := HBOUND;
        ITEMINFO.LOWANSWER := LBOUND;
        BLANKLINES(20,4,20);
        WRITELN('The new range is : ',ITEMINFO.LOWANSWER,'...',
                ITEMINFO.HIGHANSWER);
        WRITELN;
        STALL;
    END; (* changerange *)

(-----)

(* change the answer *)

```

```

PROCEDURE CHANGEANSWER;
VAR BOUND,
    SELECT : CHAR;
    I : INTEGER;

{.....}

(* get the new answer *)
PROCEDURE GETANSWER;
BEGIN
    SELECT := GETCHAR(['1'..'3'], TRUE, TRUE, TRUE);
    PAGE(OUTPUT);
    CASE SELECT OF
        '1' : BEGIN (1)
            GOTOXY(22,0);
            WRITE('MULTIPLE CHOICE/SINGLE ANSWER');
            ITEMINFO.ATYPE := CHARVALUE;
            GOTOXY(0,6);
            WRITE('Enter new answer and then press <RET> : ');
            FILLBUF(1, [ITEMINFO.LOWANSWER..ITEMINFO.HIGHANSWER],
                TRUE);
            ITEMINFO.ANSWER := LINEBUF(0);
            LINEBUF(0) := ' ';
        END; (1)
        '2' : BEGIN (2)
            GOTOXY(22,0);
            WRITE('INTEGER VALUE ANSWER');
            ITEMINFO.ATYPE := INTVALUE;
            GOTOXY(0,6);
            WRITE('Enter new answer (integer ',
                'value) and then press <RET> : ');
            READLN(1);
            ITEMINFO.INTANSWER := I;
        END; (2)
        '3' : BEGIN (3)
            GOTOXY(22,0);
            WRITE('MULTIPLE CHOICE/MULTIPLE ANSWERS');
            ITEMINFO.ATYPE := SEVENCHR;
            GOTOXY(0,6);
            WRITE('Enter the number of answers',
                ' this question has (1..7) : ');
            SELECT := GETCHAR(['1'..'7'], TRUE, TRUE, TRUE);
            ITEMINFO.ANSWERCOUNT := ORD(SELECT) - 48;
            WRITELN;
            WRITELN;
            FOR I := 1 TO ITEMINFO.ANSWERCOUNT DO
                BEGIN (4)
                    WRITE('Enter answer ', I, ', then press <RET> : ');
                    FILLBUF(1, [ITEMINFO.LOWANSWER..ITEMINFO.HIGHANSWER],
                        TRUE);
                    ITEMINFO.CHANSWER[I] := LINEBUF(0);
                    LINEBUF(0) := ' ';
                    WRITELN;
                END; (4)
            END; (3)
    END; (* cases *)
END; (* get answer *)

{.....}

BEGIN (* change answer *)
    DECODEPRINT(BLOCK, BLOCKPTR);
    GOTOXY(0,20);
    WRITE('Current answer(s) : ');
    CASE ITEMINFO.ATYPE OF
        CHARVALUE : WRITELN(ITEMINFO.ANSWER);
        INTVALUE : WRITELN(ITEMINFO.INTANSWER);
        SEVENCHR : BEGIN (1)
            FOR I := 1 TO ITEMINFO.ANSWERCOUNT DO
                WRITE(ITEMINFO.CHANSWER[I], ' ');
            WRITELN;
        END; (1)
    END;

```

```

END; (* cases *)
WRITELN;
STALL;
TEXT80MODE;
GOTOXY(20,0);
WRITE('SELECT ANSWER TYPE');
GOTOXY(0,4);
WRITE('Select one of the following options by entering its number.');
```

GOTOXY(16,8);

```
WRITE('1. MULTIPLE CHOICE/SINGLE ANSWER');
GOTOXY(16,9);
WRITE('2. INTEGER VALUE ANSWER');
GOTOXY(16,10);
WRITE('3. MULTIPLE CHOICE/MULTIPLE ANSWERS');
GOTOXY(16,14);
WRITE('Enter Choice # : ');
GETANSWER;
WRITELN;
WRITELN;
WRITE('The new answer(s) is : ');
CASE ITEMINFO.ATYPE OF
  CHARVALUE : WRITELN(ITEMINFO.ANSWER);
  INTVALUE  : WRITELN(ITEMINFO.INTANSWER);
  SEVENCHR  : BEGIN (2)
    FOR I := 1 TO ITEMINFO.ANSWERCOUNT DO
      WRITE(ITEMINFO.CHANSWER[I], ' ');
    WRITELN;
  END; (2)
END; (* cases *)
WRITELN;
STALL;
END; (* changeanswer *)
```

[-----]

```

(* change question data *)
PROCEDURE CHANGEDATA;
VAR SELECT : CHAR;
BEGIN
  REPEAT
    PAGE(OUTPUT);
    GOTOXY(20,0);
    WRITE('CHANGE QUESTION DATA MENU');
    GOTOXY(0,4);
    WRITE('Select one of the following options',
      ' by entering its number.');
```

GOTOXY(0,6);

```
WRITE('Current data : ');
GOTOXY(15,6);
WRITE('A parameter = ', ITEMINFO.A:5:3);
GOTOXY(15,7);
WRITE('B parameter = ', ITEMINFO.B:5:3);
GOTOXY(15,8);
WRITE('C parameter = ', ITEMINFO.C:5:3);
GOTOXY(16,12);
WRITE('1. QUIT');
GOTOXY(16,13);
WRITE('2. CHANGE PARAMETER A');
GOTOXY(16,14);
WRITE('3. CHANGE PARAMETER B');
GOTOXY(16,15);
WRITE('4. CHANGE PARAMETER C');
GOTOXY(16,18);
WRITE('Enter Choice # : ');
SELECT := GETCHAR(['1'..'4'], TRUE, TRUE, TRUE);
CASE SELECT OF
  '1' : ;
  '2' : BEGIN (1)
    GETPARAM('A');
    ITEMINFO.A := AVALUE;
    END; (1)
  '3' : BEGIN (2)
    GETPARAM('B');
```

```

        ITEMINFO.B := BVALUE;
        END; (2)
    '4' : BEGIN (3)
        GETPARAM('C');
        ITEMINFO.C := CVALUE;
        END; (3)
    END; (* cases *)
    UNTIL SELECT = '1';
    END; (* changedata *)

    (.....)

    BEGIN (* modify *)
        REPEAT
            MOOMENU;
            COMMAND := GETCHAR(['1'..'6'],TRUE,TRUE,TRUE);
            CASE COMMAND OF
                '1' : ;
                '2' : GETNEWID;
                '3' : CHANGTEXT;
                '4' : CHANGERANGE;
                '5' : CHANGEANSWER;
                '6' : CHANGEDATA;
            END; (* cases *)
        UNTIL COMMAND = '1';

        (* update data record to file *)
        UPDATEITEMFILE(DATASLOT);
    END; (* modify *)

    (.....)

    BEGIN (* fetch item *)
        PAGE(OUTPUT);

        PCRECNUM := (CURRINDEXRECNUM = 4) OR (CURRINDEXRECNUM = 6);
        (* is current test PC or PC-2 *)

        (* get item code to fetch *)
        CODEOK := FALSE;
        REPEAT
            WRITE('Enter the question code, then press <RET> : ');
            (*$[-*)
            READLN(CODENUM);
            (*$[+*)

            (* if valid code # >= 0 *)
            IF CODENUM >= 0 THEN
                BEGIN (1)
                    SLOT := SLOTSEARCH(CODENUM);

                    (* if code # does not exist in subtest directory *)
                    IF SLOT = NIL THEN
                        BEGIN (2)
                            WRITELN;
                            WRITELN('No item with code # ',CODENUM);
                            SQUAWK;
                            WRITELN;
                            STALL;
                            EXIT(FETCHITEM);
                        END (2)
                    ELSE
                        CODEOK := TRUE;
                END (1)
            ELSE
                BEGIN (3)
                    SQUAWK;
                    WRITELN;
                    WRITELN('Id # must be a positive number. ');
                    WRITELN;
                    STALL;
                    EXIT(FETCHITEM);
                END; (3)
            END;
        UNTIL CODEOK;
    END;

```

```

UNTIL CODEOK;

(* get location of data *)
DATASLOT := HASH(SLOT);
PAGE(OUTPUT);

(* get the data *)
RESET(FILEITEMINFO,DATANAME);
SEEK(FILEITEMINFO,DATASLOT);
GET(FILEITEMINFO);
ITEMINFO := FILEITEMINFO^;
CLOSE(FILEITEMINFO,LOCK);
BLOCK := ITEMINFO.ITEMBLOCK;
BLOCKPTR := ITEMINFO.ITEMPTR;

(* allow various options *)
REPEAT
  ITEMMENU;
  COMMAND := GETCHAR(['1'..'6'],TRUE,TRUE,TRUE);
  CASE COMMAND OF
    '1' : ;
    '2' : SHOWITEM;
    '3' : SHOWINFO;
    '4' : MODIFYITEM;
    '5' : DELETEITEM;
    '6' : BEGIN (4)
      SETGFLAG;
      (* update data record to file *)
      UPDATEITEMFILE(DATASLOT);
    END; (4)
  END; (* cases *)
UNTIL COMMAND = '1';
END; (* fetch item *)

{-----}

(* loads a test . allows various options *)
SEGMENT PROCEDURE FETCHTEST;
VAR COMMAND : CHAR;

{.....}

(* displays command selection for fetch test *)
PROCEDURE FETCHMENU;
BEGIN
  TEXT80MODE;
  NORMAL;
  GOTOXY(20,0);
  WRITE('FETCH SUBTEST MENU');
  GOTOXY(0,4);
  WRITE('Select one of the following procedures by entering its number. ');
  GOTOXY(0,6);
  WRITE('Currently managing subtest : ',DIRECTORY.TESTNAME);
  GOTOXY(16,9);
  WRITE('1. QUIT');
  GOTOXY(16,10);
  WRITE('2. ADD NEW QUESTION');
  GOTOXY(16,11);
  WRITE('3. FETCH A QUESTION');
  GOTOXY(16,12);
  WRITE('4. LIST SUBTEST QUESTIONS');
  GOTOXY(16,13);
  WRITE('5. SAMPLE QUESTION MANAGEMENT');
  GOTOXY(16,14);
  WRITE('6. SUBTEST INSTRUCTIONS MANAGEMENT');
  GOTOXY(16,18);
  WRITE('Enter Choice # : ');
END;

{.....}

BEGIN (* fetchtest *)
  REPEAT

```

```
FETCHMENU;  
COMMAND := GETCHAR(['1'..'6'],TRUE,TRUE,TRUE);  
CASE COMMAND OF  
  '1' : ;  
  '2' : INSERTITEM;  
  '3' : FETCHITEM;  
  '4' : LISTITEMS;  
  '5' : SAMPLEQUESTIONS;  
  '6' : INSTRUCTIONS;  
END; (* cases *)  
UNTIL COMMAND = '1';  
END; (* fetch test *)
```

```
(*****
(*)
(*)      Textfile : TMGR.DIR/T.INSTR.TEXT      Volume : TFILES      (*)
(*)      Codefile : T.MGR.CODE ('Include' file) Volume : CATDATA    (*)
(*)
(*)
(*)
(*)      File last modified : Feb 18, 1983      NPRDC              (*)
(*****)
```

# SEGMENT PROCEDURE INSTRUCTIONS;

```
VAR
  HASH_LOC : INTEGER;
  COMMAND : CHAR;

  (.....)
```

```
PROCEDURE MENU;
BEGIN
  TEXT80MODE;
  NORMAL;
  GOTOXY(20,0);
  WRITE('SUBTEST INSTRUCTIONS MENU');
  GOTOXY(0,4);
  WRITE('Select one of the following procedures by entering its number. ');
  GOTOXY(16,8);
  WRITE('1. QUIT');
  GOTOXY(16,9);
  WRITE('2. ENTER INSTRUCTIONS');
  GOTOXY(16,10);
  WRITE('3. VIEW INSTRUCTIONS');
  GOTOXY(16,11);
  WRITE('4. MODIFY INSTRUCTIONS');
  GOTOXY(16,12);
  WRITE('5. DELETE INSTRUCTIONS');
  GOTOXY(16,16);
  WRITE('Enter Choice # : ');
END; (* menu *)
```

```
(-----)
```

```
PROCEDURE ENTER_INSTRUCTIONS;
BEGIN
  IF DIRECTORY.ITEMCODE(0) > 0
  THEN
    BEGIN (1)
      PAGE(OUTPUT);
      WRITELN;
      WRITELN('Subtest instructions already exist. ');
      WRITELN;
      SQUAWK;
      STALL;
      EXIT(ENTER_INSTRUCTIONS);
    END; (1)

  DIRECTORY.ITEM_CODE(0) := 1;
  LOADPTRS;
  ITEM_INFO.ITEM_PTR := CURR_FREE_PTR;
  ITEM_INFO.ITEM_BLOCK := CURR_BLOCK;
  FILL_SCREEN_BUFFER(TOP_MAX, RIGHT_MAX, BOTTOM_MAX, LEFT_MAX, TRUE);
  CODE_SCREEN(TRUE);
  SAVE_PTRS;
  UPDATE_DIRECTORY(CURR_INDEX_REC_NUM);
  HASH_LOC := HASH(0);
  UPDATE_ITEM_FILE(HASH_LOC);
END; (* enter instructions *)
```

```
(-----)
```

```
PROCEDURE MODIFYINSTRUCTIONS;
VAR MODPTR,
    MODBLOCK,
    OLDPTR;
```

```

OLDBLOCK,
BLOCK,
BLOCKPTR : INTEGER;
ENDTEXT,
RECODE,
DONE : BOOLEAN;

{.....}

(* reads item text file & displays page *)
PROCEDURE PAGEPRINT(VAR LASTPAGE : BOOLEAN);
VAR X,
    Y,
    SCREENBYTES,
    CHARCODE,
    SKIPBYTE : INTEGER;

{.....}

(* returns next code in item file *)
FUNCTION BUFFERCODE : INTEGER;
BEGIN
    BUFFERCODE := TRIX.ASCII[BUF(MOOPTR);
    MOOPTR := MOOPTR + 1;
    IF MOOPTR > 2047
    THEN
        BEGIN (1)
            MOOBLOCK := MOOBLOCK + 4;
            READITEMBLOCK(MOOBLOCK);
            MOOPTR := 0;
        END; (1)
    END; (* buffercode *)

{.....}

BEGIN (* page print *)
    SCREENBYTES :=
        (XSCREEN + 1) * (YSCREEN + 1);
    FILLCHAR(SCREEN[0], SCREENBYTES, ' ');
    SETSCREEN;
    READITEMBLOCK(MOOBLOCK);

    REPEAT
        CHARCODE := BUFFERCODE;
        CASE CHARCODE OF
            GOTOFLAG : BEGIN (1)
                X := BUFFERCODE;
                Y := BUFFERCODE;
                SKIPBYTE := BUFFERCODE;
                GOTOXY(X,Y);
            END; (1)
            PAGEFLAG : ;
            ENDITEM : ;
        END; (* cases *)

        IF (CHARCODE >= 32) AND (CHARCODE <= 126)
        THEN
            BEGIN (2)
                SCREEN(X,Y) := CHR(CHARCODE);
                X := X + 1;
                WRITE(CHR(CHARCODE));
            END; (2)
        UNTIL (CHARCODE = ENDITEM) OR (CHARCODE = PAGEFLAG);

        IF CHARCODE = ENDITEM
        THEN
            LASTPAGE := TRUE
        ELSE
            LASTPAGE := FALSE;
    END; (* page print *)

{.....}

```

```

BEGIN (* modify instructions *)
  IF DIRECTORY.ITEMCODE[0] < 0
  THEN
    BEGIN (1)
      PAGE(OUTPUT);
      Writeln;
      Writeln('No instructions to modify.....');
      Writeln;
      SQuAwK;
      STAll;
      EXIT(MODIFYINSTRUCTIONS);
    END; (1)

    HASH_LOC := HASH(0);
    RESET(FILEITEMINFO,DATANAME);
    SEEK(FILEITEMINFO,HASH_LOC);
    GET(FILEITEMINFO);
    ITEMINFO := FILEITEMINFO^;
    CLOSE(FILEITEMINFO,LOCK);
    PAGE(OUTPUT);
    Writeln;
    WRITE('Change instruction text? Press ''N'' or ''Y'' : ');

    IF GETCHAR(['y','n','Y','N'],TRUE,TRUE,TRUE) IN ['Y','y']
    THEN
      BEGIN (2)
        LOADPTRS;
        MODBLOCK := ITEMINFO.ITEMBLOCK;
        MODPTR := ITEMINFO.ITEmpTR;
        (* save ptrs to beginning of text *)
        ITEMINFO.ITEMBLOCK := CURRBLOCK;
        ITEMINFO.ITEmpTR := CURRFREEPTR;
        (* save old ptrs to delete old text *)
        OLDBLOCK := MODBLOCK;
        OLDPTR := MODPTR;
        BLOCK := CURRBLOCK;
        BLOCKPTR := CURRFREEPTR;
        RECODE := TRUE;

        REPEAT
          PAGEPRINT(ENDTEXT);
          FILLSCREENBUFFER(TOPMAX, RIGHTMAX, BOTTOMMAX, LEFTMAX, FALSE);
          IF NOT (ENDTEXT) THEN CODESCREEN(FALSE);
        UNTIL ENDTEXT;
      END (2)
    ELSE
      RECODE := FALSE;

    IF RECODE
    THEN
      BEGIN (3)
        CODESCREEN(TRUE);
        SAVEPTRS;
      END; (3)
      UPDATEITEMFILE(HASH_LOC);
    END; (* modify instructions *)

    (-----)

    PROCEDURE VIEWINSTRUCTIONS;
    VAR BLOCK,
        BLOCKPTR : INTEGER;

    BEGIN (* view instructions *)
      IF DIRECTORY.ITEMCODE[0] < 0
      THEN
        BEGIN (1)
          PAGE(OUTPUT);
          Writeln;
          Writeln('No instructions to view.....');
          Writeln;
          SQuAwK;

```

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MICROCOMPUTER NETWORK FOR COMPUTERIZED ADAPTIVE TESTING 3/5

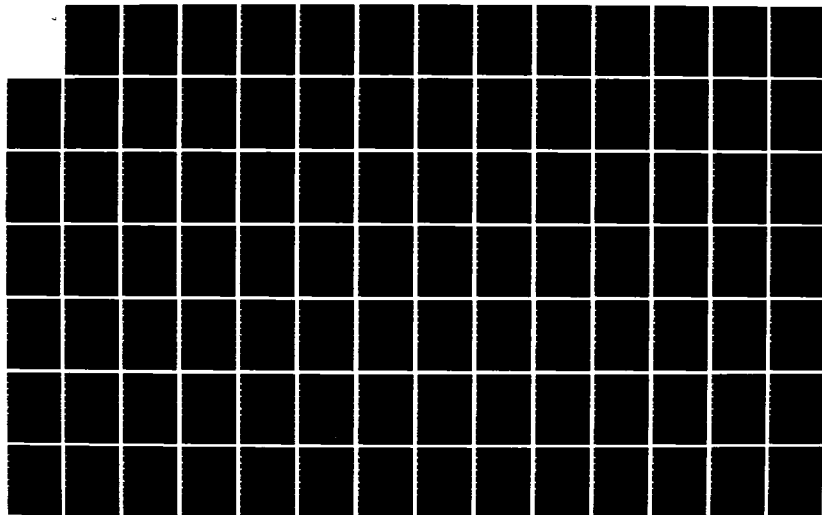
(CAT): PROGRAM LI. (U) NAVY PERSONNEL RESEARCH AND  
DEVELOPMENT CENTER SAN DIEGO CA B QUAN ET AL. MAR 84

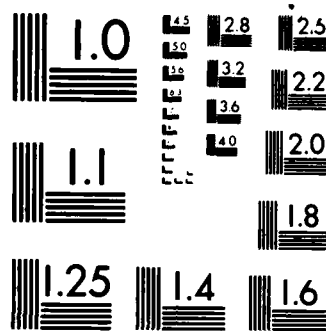
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NPRDC-TR-84-33-SUPPL

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NL





MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

```

        STALL;
        EXIT(VIEWINSTRUCTIONS);
    END; (1)

    HASH_LOC := HASH(0);
    RESET(FILEITEMINFO,DATANAME);
    SEEK(FILEITEMINFO,HASH_LOC);
    GET(FILEITEMINFO);
    ITEMINFO := FILEITEMINFO^;
    CLOSE(FILEITEMINFO,LOCK);
    BLOCK := ITEMINFO.ITEMBLOCK;
    BLOCKPTR := ITEMINFO.ITEMPTR;
    DECODEPRINT(BLOCK,BLOCKPTR);
    GOTOXY(0,21);
    STALL;
END; (* view instructions *)

(-----)

PROCEDURE DELETEINSTRUCTIONS;
VAR I,HASHLOC : INTEGER;
BEGIN
    IF DIRECTORY.ITEMCODE(0) < 0
    THEN
        BEGIN (1)
            PAGE(OUTPUT);
            WRITELN;
            WRITELN('No instructions to delete.....');
            WRITELN;
            SQUAWK;
            STALL;
            EXIT(DELETEINSTRUCTIONS);
        END; (1)

        PAGE(OUTPUT);
        GOTOXY(15,0);
        WRITE('***** WARNING *****');
        GOTOXY(0,3);
        WRITELN('You have selected the ''delete instructions'' option.',
            ' This will');
        WRITELN('purge the existing instructions from the files. ');
        WRITELN;
        WRITELN;
        WRITE('Do you wish to delete the instructions? Press ''N'' or ''Y'' : ');

        IF GETCHAR(['Y','y','N','n'],TRUE,TRUE,TRUE) IN ['Y','y']
        THEN
            BEGIN (2)
                PAGE(OUTPUT);
                WRITELN;
                WRITE('Deleting instructions ');
                FOR I := 1 TO 500 DO
                    IF I MOD 50 = 0 THEN WRITE('. ');
                DIRECTORY.ITEMCODE(0) := NIL;
                UPDATEDIRECTORY(CURRINDEXRECNUM);
            END; (2)
        END; (* delete instructions *)

    (.....)

    BEGIN (* instructions *)
        REPEAT
            MENU;
            COMMAND := GETCHAR(['1'..'5'],TRUE,FALSE,TRUE);
            CASE COMMAND OF
                '1' : ;
                '2' : ENTER_INSTRUCTIONS;
                '3' : VIEWINSTRUCTIONS;
                '4' : MODIFY_INSTRUCTIONS;
                '5' : DELETEINSTRUCTIONS;
            END; (* cases *)
        UNTIL COMMAND = '1';
    END; (* instructions *)

```



```
(*****)
(*)
(*)      Textfile : TMGR.DIR/T.SAMPLES.TEXT      Volume : TFILES      (*)
(*)      Codefile : T.MGR.CODE ('Include' file) Volume : CATDATA      (*)
(*)      (*)
(*)
(*)      File last modified : Feb 18, 1983      NPRDC      (*)
(*****)
```

SEGMENT PROCEDURE SAMPLEQUESTIONS;

```
VAR I,
    SCOUNT,
    HASH_LOC : INTEGER;
    COMMAND : CHAR;

    {.....}

    (* sample menu *)
    PROCEDURE MENU;
    BEGIN
        TEXT80MODE;
        NORMAL;
        GOTOXY(20,0);
        WRITE('SUBTEST SAMPLES MENU');
        GOTOXY(0,4);
        WRITE('Select one of the following procedures by entering its number. ');
        GOTOXY(16,8);
        WRITE('1. QUIT');
        GOTOXY(16,9);
        WRITE('2. ENTER SAMPLE QUESTION');
        GOTOXY(16,10);
        WRITE('3. VIEW SAMPLE QUESTION');
        GOTOXY(16,11);
        WRITE('4. MODIFY SAMPLE QUESTION');
        GOTOXY(16,12);
        WRITE('5. DELETE SAMPLE QUESTION');
        GOTOXY(16,16);
        WRITE('Enter Choice # : ');
    END; (* menu *)

    {-----}

    (* remove a sample question *)
    PROCEDURE DELETESAMPLE;
    VAR HASHLOC,
        Z : INTEGER;
        ERROR : BOOLEAN;
    BEGIN
        PAGE(OUTPUT);
        GOTOXY(15,0);
        WRITE('***** WARNING *****');
        GOTOXY(0,3);
        WRITELN('You have selected the "delete sample question" option.',
            ' This will');
        WRITELN('purge an existing sample question from the files. ');
        WRITELN;
        WRITELN;
        WRITE('Do you wish to continue? Press "N" or "Y" : ');
        IF GETCHAR(['Y','y','N','n'],TRUE,TRUE,TRUE) IN ['Y','y']
        THEN
            BEGIN (1)
                PAGE(OUTPUT);
                WRITELN;
                WRITELN('Delete which sample question? (1..5)');
                WRITE('Enter the number then press <RET> : ');
                READLN(Z);
                ERROR := FALSE;
                IF (Z > MAXSAMPLES) OR (Z < 1)
                THEN
                    ERROR := TRUE
                ELSE
                    IF DIRECTORY.ITEMCODE(Z) < 0 THEN ERROR := TRUE;
```

```

        IF ERROR
        THEN
            BEGIN (2)
                WRITELN;
                WRITELN;
                WRITELN('No such sample question!');
                SQUAWK;
                WRITELN;
                STALL;
                EXIT(DELETESAMPLE);
            END; (2)
        DIRECTORY.ITEMCODE[Z] := NIL;
        SCOUNT := SCOUNT - 1;
        UPDATEDIRECTORY(CURRINDEXRECNUM);
        PAGE(OUTPUT);
        WRITELN;
        WRITE('Deleting sample question. ');
        FOR Z := 1 TO 500 DO
            IF (Z MOD 50) = 0 THEN WRITE('. ');
        END; (1)
    END; (* delete samples *)

    (-----)

    (* add a sample question *)
    PROCEDURE ENTER_SAMPLES;
    VAR I,
        X,Z : INTEGER;
        SELECT : CHAR;

    BEGIN (* enter samples *)
        PAGE(OUTPUT);
        X := 0;
        Z := 0;
        REPEAT
            X := X + 1;
            IF DIRECTORY.ITEMCODE[X] > 0
            THEN
                BEGIN (1)
                    Z := Z + 1;
                    WRITELN('Sample question ',X,' exists. ');
                END; (1)
            UNTIL (X >= MAXSAMPLES);
            IF Z >= MAXSAMPLES
            THEN
                BEGIN (2)
                    WRITELN;
                    WRITELN('No room for more sample questions. ');
                    WRITELN;
                    SQUAWK;
                    STALL;
                    EXIT(ENTERSAMPLES);
                END; (2)
            WRITELN;
            WRITELN;
            WRITELN('Make which sample question? (1..5)');
            WRITE('Enter the number then press <RET> : ');
            READLN(Z);
            IF (Z > MAXSAMPLES) OR (Z < 1)
            THEN
                BEGIN (3)
                    WRITELN;
                    WRITELN;
                    WRITELN('Bad input! Should be a number from 1 to 5. ');
                    SQUAWK;
                    WRITELN;
                    STALL;
                    EXIT(ENTERSAMPLES);
                END (3)
            ELSE
                IF DIRECTORY.ITEMCODE[Z] > 0
                THEN
                    BEGIN (4)

```

```

        WRITELN;
        WRITELN;
        WRITELN('Sample question ',Z,' exists already!');
        SQUAWK;
        WRITELN;
        STALL;
        EXIT(ENTERSAMPLES);
    END; (4)
    DIRECTORY.ITEM_CODE(Z) := 1;
    LOADPTRS;
    ITEM_INFO.ITEM_PTR := CURR_FREE_PTR;
    ITEM_INFO.ITEM_BLOCK := CURR_BLOCK;
    FILL_SCREEN_BUFFER(TOP_MAX, RIGHT_MAX, BOTTOM_MAX, LEFT_MAX, TRUE);
    TEXT80MODE;
    SETGFLAG;
    SELECTATYPE;
    CODE_SCREEN(TRUE);
    SAVE_PTRS;
    UPDATE_DIRECTORY(CURR_INDEX_REC_NUM);
    HASH_LOC := HASH(Z);
    UPDATE_ITEM_FILE(HASH_LOC);
    SCOUNT := SCOUNT + 1;
END; (* enter samples *)

(-----)

(* modify an existing sample *)
PROCEDURE MODIFYSAMPLES;
VAR Z,
    I,
    MODPTR,
    MODBLOCK,
    BLOCK,
    BLOCKPTR : INTEGER;
    ENDTEXT,
    ERROR,
    DONE : BOOLEAN;
    SELECT : CHAR;

    (.....)

    (* change the answer selection range data *)
    PROCEDURE CHANGERANGE;
    VAR LBOUND,
        HBOUND : CHAR;
        ERR : BOOLEAN;

    BEGIN

        (* display the question *)
        DECODEPRINT(MODBLOCK,MODPTR);

        (* get new answer range *)
        GOTOXY(8,28);
        WRITELN('Current range : ',ITEMINFO.LOWANSWER,'..',
            ITEMINFO.HIGHANSWER);
        WRITE('New low bound? (letter/digit) : ');
        LBOUND := GETCHAR(['0'..'9','A'..'Z'],TRUE,TRUE,TRUE);
        WRITELN;
        WRITE('New high bound? (letter/digit) : ');
        HBOUND := GETCHAR(['0'..'9','A'..'Z'],TRUE,TRUE,TRUE);
        ERR := FALSE;

        IF (HBOUND IN ['0'..'9'])
        THEN
            IF NOT (LBOUND IN ['0'..'9']) THEN ERR := TRUE;

        IF (HBOUND IN ['A'..'Z'])
        THEN
            IF NOT (LBOUND IN ['A'..'Z']) THEN ERR := TRUE;

        IF ERR
        THEN

```

```

BEGIN (1)
  BLANKLINES(20,4,20);
  WRITELN('Bounds range type mismatch error!');
  SQUAWK;
  WRITELN;
  STALL;
  EXIT(CHANGERANGE);
END; (1)

IF ORD(LBOUND) > ORD(HBOUND)
THEN
  BEGIN (2)
    BLANKLINES(20,4,20);
    WRITELN('Low bound exceeds high bound error!');
    SQUAWK;
    WRITELN;
    STALL;
    EXIT(CHANGERANGE);
  END; (2)

  ITEMINFO.HIGHANSWER := HBOUND;
  ITEMINFO.LOWANSWER := LBOUND;
  BLANKLINES(20,4,20);
  WRITELN('The new range is : ',ITEMINFO.LOWANSWER,'..',
    ITEMINFO.HIGHANSWER);
  WRITELN;
  STALL;
END; (* change range *)

(-----)

(* change the answer *)
PROCEDURE CHANGEANSWER;
VAR SELECT : CHAR;
    I : INTEGER;

  (.....)

  (* get the new answer *)
  PROCEDURE GETANSWER;
  BEGIN
    SELECT := GETCHAR(['1'..'3'],TRUE,TRUE,TRUE);
    PAGE(OUTPUT);
    CASE SELECT OF
      '1' : BEGIN (1)
        GOTOXY(22,0);
        WRITE('MULTIPLE CHOICE/SINGLE ANSWER');
        ITEMINFO.ATYPE := CHARVALUE;
        GOTOXY(0,6);
        WRITE('Enter new answer and then press <RET> ');
        FILLBUF(1,(ITEMINFO.LOWANSWER..ITEMINFO.HIGHANSWER),
          TRUE);
        ITEMINFO.ANSWER := LINEBUF(0);
        LINEBUF(0) := ' ';
      END; (1)
      '2' : BEGIN (2)
        GOTOXY(22,0);
        WRITE('INTEGER VALUE ANSWER');
        ITEMINFO.ATYPE := INTVALUE;
        GOTOXY(0,6);
        WRITE('Enter new answer (integer ',
          'value) and then press <RET> ');
        READLN(I);
        ITEMINFO.INTANSWER := I;
      END; (2)
      '3' : BEGIN (3)
        GOTOXY(22,0);
        WRITE('MULTIPLE CHOICE/MULTIPLE ANSWERS');
        ITEMINFO.ATYPE := SEVENCHR;
        GOTOXY(0,6);
        WRITE('Enter the number of answers',
          'this question has (1..7) ');
        SELECT := GETCHAR(['1'..'7'],TRUE,TRUE,TRUE);

```

```

ITEMINFO.ANSWERCOUNT := ORD(SELECT) - 48;
WRITELN;
WRITELN;
FOR I := 1 TO ITEMINFO.ANSWERCOUNT DO
BEGIN (4)
  WRITE('Enter answer ',I,', then press <RET> : ');
  FILLBUF(1,
    [ITEMINFO.LOWANSWER..ITEMINFO.HIGHANSWER],
    TRUE);
  ITEMINFO.CHANSWER[I] := LINEBUF[0];
  LINEBUF[0] := ' ';
  WRITELN;
END; (4)
END; (3)
END; (* case *)
END; (* get answer *)

(.....)

BEGIN (* change answer *)
  DECODEPRINT(MODBLOCK,MODPTR);
  GOTOXY(0,20);
  WRITE('Current answer(s) : ');
  CASE ITEMINFO.ATYPE OF
    CHARVALUE : WRITELN(ITEMINFO.ANSWER);
    INTVALUE : WRITELN(ITEMINFO.INTANSWER);
    SEVENCHR : BEGIN (1)
      FOR I := 1 TO ITEMINFO.ANSWERCOUNT DO
        WRITE(ITEMINFO.CHANSWER[I], ' ');
      WRITELN;
      END; (1)
    END; (* cases *)
    WRITELN;
    STALL;
    TEXT80MODE;
    GOTOXY(20,0);
    WRITE('SELECT ANSWER TYPE');
    GOTOXY(0,4);
    WRITE
      ('Select one of the following options by entering its number. ');
    GOTOXY(16,8);
    WRITE('1. MULTIPLE CHOICE/SINGLE ANSWER');
    GOTOXY(16,9);
    WRITE('2. INTEGER VALUE ANSWER');
    GOTOXY(16,10);
    WRITE('3. MULTIPLE CHOICE/MULTIPLE ANSWERS');
    GOTOXY(16,14);
    WRITE('Enter Choice # : ');
    GETANSWER;
    WRITELN;
    WRITELN;
    WRITE('The new answer(s) is : ');
    CASE ITEMINFO.ATYPE OF
      CHARVALUE : WRITELN(ITEMINFO.ANSWER);
      INTVALUE : WRITELN(ITEMINFO.INTANSWER);
      SEVENCHR : BEGIN (2)
        FOR I := 1 TO ITEMINFO.ANSWERCOUNT DO
          WRITE(ITEMINFO.CHANSWER[I], ' ');
        WRITELN;
        END; (2)
      END; (* cases *)
      WRITELN;
      STALL;
    END; (* change answer *)

  (-----)

  (* reads item text file & displays page *)
  PROCEDURE PAGEPRINT(VAR LASTPAGE : BOOLEAN);
  VAR X,
      Y,
      SCREENBYTES,
      CHARCODE,

```

```

SKIPBYTE : INTEGER;

{.....}

(* returns next code in item file *)
FUNCTION BUFFERCODE : INTEGER;
BEGIN
  BUFFERCODE := TRIX.ASCIIBUF(MODPTR);
  MODPTR := MODPTR + 1;
  IF MODPTR > 2047
  THEN
    BEGIN (1)
      MODBLOCK := MODBLOCK + 4;
      READITEMBLOCK(MODBLOCK);
      MODPTR := 0;
    END; (1)
  END; (* buffercode *)

{.....}

BEGIN (* page print *)
  SCREENBYTES :=
    (XSCREEN + 1) * (YSCREEN + 1);
  FILLCHAR(SCREEN[0], SCREENBYTES, ' ');
  SETSCREEN;
  READITEMBLOCK(MODBLOCK);
  REPEAT
    CHARCODE := BUFFERCODE;
    CASE CHARCODE OF
      GOTOFLAG : BEGIN (1)
        X := BUFFERCODE;
        Y := BUFFERCODE;
        SKIPBYTE := BUFFERCODE;
        GOTOXY(X,Y);
      END; (1)
    PAGEFLAG : ;
    ENDITEM : ;
  END;

  IF (CHARCODE >= 32) AND (CHARCODE <= 126)
  THEN
    BEGIN (2)
      SCREEN(X,Y) := CHR(CHARCODE);
      X := X + 1;
      WRITE(CHR(CHARCODE));
    END; (2)
  UNTIL (CHARCODE = ENDITEM) OR (CHARCODE = PAGEFLAG);

  IF CHARCODE = ENDITEM
  THEN
    LASTPAGE := TRUE
  ELSE
    LASTPAGE := FALSE;
  END; (* page print *)

{.....}

BEGIN (* modify samples *)
  PAGE(OUTPUT);
  WRITELN;
  WRITELN('View what sample question? (1..5)');
  WRITE('Enter the number then press <RET> : ');
  READLN(Z);
  ERROR := FALSE;

  IF (Z > MAXSAMPLES) OR (Z < 1)
  THEN
    ERROR := TRUE
  ELSE
    IF DIRECTORY.ITEMCODE(Z) < 0 THEN ERROR := TRUE;

  IF ERROR
  THEN

```

```

        BEGIN (1)
        WRITELN;
        WRITELN;
        WRITELN('No such sample question!');
        SQUALK;
        WRITELN;
        STALL;
        EXIT(MODIFYSAMPLES);
    END; (1)

    HASH_LOC := HASH(Z);
    RESET(FILEITEMINFO,DATANAME);
    SEEK(FILEITEMINFO,HASH_LOC);
    GET(FILEITEMINFO);
    ITEMINFO := FILEITEMINFO^;
    CLOSE(FILEITEMINFO,LOCK);

    REPEAT
        TEXT80MODE;
        GOTOXY(28,8);
        WRITE('MODIFY SAMPLE QUESTION MENU');
        GOTOXY(8,4);
        WRITE('Select one of the following options by entering its number. ');
        GOTOXY(16,8);
        WRITE('1. QUIT');
        GOTOXY(16,9);
        WRITE('2. MODIFY SAMPLE TEXT');
        GOTOXY(16,10);
        WRITE('3. MODIFY SAMPLE ANSWER');
        GOTOXY(16,11);
        WRITE('4. MODIFY SAMPLE ANSWER RANGE');
        GOTOXY(16,12);
        WRITE('5. MODIFY GRAPHICS FLAG');
        GOTOXY(16,16);
        WRITE('Enter Choice # : ');
        MODBLOCK := ITEMINFO.ITEMBLOCK;
        MODPTR := ITEMINFO.ITEMPTR;
        SELECT := GETCHAR({'1'..'5'},TRUE,TRUE,TRUE);
        CASE SELECT OF
            '1' : ;
            '2' : BEGIN (2)
                    LOADPTRS;
                    (* save ptrs to beginning of text *)
                    ITEMINFO.ITEMBLOCK := CURRBLOCK;
                    ITEMINFO.ITEMPTR := CURRFREEPTR;
                    BLOCK := CURRBLOCK;
                    BLOCKPTR := CURRFREEPTR;

                    REPEAT
                        PAGEPRINT(ENDTEXT);
                        FILLSCREENBUFFER(TOPMAX,RIGHTMAX,BOTTOMMAX,LEFTMAX,FALSE);
                        IF NOT (ENDTEXT)
                            THEN
                                CODESCREEN(FALSE);
                    UNTIL ENDTEXT;

                    CODESCREEN(TRUE);
                    SAVEPTRS;
                    END; (2)
            '3' : CHANGEANSWER;
            '4' : CHANGERANGE;
            '5' : SETGFLAG;
        END; (* cases *)
    UNTIL SELECT = '1';
    UPDATEITEMFILE(HASH_LOC);
    END; (* modifyitem *)

    {-----}

    (* look at sample question *)
    PROCEDURE VIEWSAMPLES;
    VAR I,
        Z,

```

```

BLOCK;
BLOCKPTR : INTEGER;
ERROR : BOOLEAN;

BEGIN (* view samples *)
PAGE(OUTPUT);
Writeln;
Writeln('View what sample question? (1..5)');
Write('Enter the number then press <RET> : ');
Readln(Z);
ERROR := FALSE;

IF (Z > MAXSAMPLES) OR (Z < 1)
THEN
    ERROR := TRUE
ELSE
    IF DIRECTORY.ITEMCODE(Z) < 0 THEN ERROR := TRUE;

IF ERROR
THEN
    BEGIN (1)
        Writeln;
        Writeln('No such sample question!');
        Squawk;
        Writeln;
        Stall;
        Exit(VIEWSAMPLES);
    END; (1)

HASH_LOC := HASH(Z);
RESET(FILEITEMINFO,DATNAME);
SEEK(FILEITEMINFO,HASH_LOC);
GET(FILEITEMINFO);
ITEMINFO := FILEITEMINFO^;
CLOSE(FILEITEMINFO,LOCK);
BLOCK := ITEMINFO.ITEMBLOCK;
BLOCKPTR := ITEMINFO.ITEMPTR;
DECODEPRINT(BLOCK,BLOCKPTR);
GOTOXY(0,20);
Write('Answer(s) : ');
CASE ITEMINFO.ATYPE OF
    CHARVALUE : Writeln(ITEMINFO.ANSWER);
    INTVALUE : Writeln(ITEMINFO.INTANSWER);
    SEVENCHR : BEGIN (2)
        FOR I := 1 TO ITEMINFO.ANSWERCOUNT DO
            Write(ITEMINFO.CHANSWER(I), ' ');
            Writeln;
        END; (2)
END; (* cases *)
Writeln;
Stall;
END; (* view samples *)

{.....}

BEGIN (* sample questions *)

(* figure out how many sample questions there are *)
SCOUNT := 0;
FOR I := 1 TO MAXSAMPLES DO
    IF DIRECTORY.ITEMCODE(I) > 0 THEN SCOUNT := SCOUNT + 1;

REPEAT
MENU;
COMMAND := GETCHAR(['1'..'5'],TRUE,FALSE,TRUE);
CASE COMMAND OF
    '1' : ;
    '2' : ENTER_SAMPLES;
    '3' : VIEWSAMPLES;
    '4' : MODIFY_SAMPLES;
    '5' : DELETESAMPLE;
END;
UNTIL COMMAND = '1';

```

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END; (\* sample questions \*)

```

(*****)
(*)
(*)      Textfile : TMGR.DIR/T.LIST.TEXT      Volume : TFILES      (*)
(*)      Codefile : T.MGR.CODE ('Include' file) Volume : CATDATA    (*)
(*)
(*****)
(*)      DEC. 1, 1982      NPRDC      (*)
(*****)

```

```

(* lists the directory test names to the screen *)
SEGMENT PROCEDURE LISTTESTS(SHOWFILEINFO : BOOLEAN);
VAR I,J,K,ITEMCOUNT : INTEGER;
BEGIN

```

```

  PAGE(OUTPUT);
  GOTOXY(24,0);
  WRITE('LIST OF SUBTESTS');
  I := 0;
  J := 0;
  GOTOXY(0,3);

  REPEAT
    IF NOT (DIRINFO[I].NOTUSED)
    THEN
      BEGIN (1)
        J := J + 1;
        IF J <= 10
        THEN
          GOTOXY(0,2+J)
        ELSE
          GOTOXY(40,2+J-10);
          WRITE(J,' ',DIRINFO[I].TNAME);
          Writeln(' ',DIRINFO[I].ITEMCOUNT,'');
        END; (1)
        I := I + 1;
      UNTIL I > MAXSUBTESTS;

      IF SHOWFILEINFO
      THEN
        BEGIN (2)
          GOTOXY(0,18);
          Writeln(J, ' files in directory, ', (MAXSUBTESTS - J + 1), ' unused');
          Writeln;
          STALL;
        END; (2)
    END; (* list tests *)

```

```

{-----}

```

```

(* lists the tests in directory & loads *)
SEGMENT PROCEDURE LOADTEST(MESSAGE : STRING);
VAR Q,
    TESTNUM,
    RECNUM : INTEGER;
    OKTEST : BOOLEAN;
    TEXTCODE : CHAR;

```

```

BEGIN (* load test *)
  OKTEST := FALSE;
  LISTTESTS(FALSE);
  RESET(FILEDIRECTORY,INDEXNAME);

  REPEAT
    GOTOXY(0,15);
    Writeln('INSTRUCTIONS : Enter choice #, then press <RET>.');
    WRITE('          To escape, press 0 then <RET>.');
    GOTOXY(0,18);
    WRITE(MESSAGE);
  (**I-*)
    READLN(TESTNUM);
  (**I+*)

    IF TESTNUM = 0
    THEN

```

```

      BEGIN (1)
        ESCPROC := TRUE;
        CLOSE(FILEDIRECTORY,LOCK);
        EXIT(LOADTEST);
      END; (1)

    IF (TESTNUM < 0) OR (TESTNUM > (MAXSUBTESTS+1))
    THEN
      BEGIN (2)
        WRITELN;
        WRITELN('Invalid test # : ',TESTNUM);
        SQUAWK;
        WRITELN;
        STALL;
      END (2)
    ELSE
      BEGIN (3)
        RECNUM := 0;
        Q := 0;

        REPEAT
          SEEK(FILEDIRECTORY,RECNUM);
          GET(FILEDIRECTORY);
          IF NOT (FILEDIRECTORY^.UNUSED) THEN Q := Q + 1;
          RECNUM := RECNUM + 1;
        UNTIL (Q = TESTNUM) OR (RECNUM > MAXSUBTESTS);

        IF Q = TESTNUM
        THEN
          BEGIN (4)
            CURRINDEXRECNUM := RECNUM - 1;
            OKTEST := TRUE;
          END (4)
        ELSE
          BEGIN (5)
            WRITELN;
            WRITELN('No test loaded');
            WRITELN;
            STALL;
          END; (5)
        END; (3)
      IF NOT OKTEST THEN BLANKLINES(18,6,18);
      UNTIL OKTEST;

      SEEK(FILEDIRECTORY,CURRINDEXRECNUM);
      GET(FILEDIRECTORY);
      DIRECTORY := FILEDIRECTORY^;
      RIGHTMAX := 38;
      SCR80 := FALSE;
      VNORMAL := FALSE;
      TEXTCODE := DIRECTORY.TESTNAME(1);

      CASE TEXTCODE OF
        '*' : BEGIN (6)
          RIGHTMAX := 78;
          SCR80 := TRUE;
          VNORMAL := FALSE;
        END; (6)
        'e' : BEGIN (7)
          RIGHTMAX := 78;
          SCR80 := TRUE;
          VNORMAL := TRUE;
        END; (7)
        '?' : BEGIN (8)
          RIGHTMAX := 38;
          SCR80 := FALSE;
          VNORMAL := TRUE;
        END; (8)
      END; (* cases *)
      CLOSE(FILEDIRECTORY,LOCK);
    END; (* load test *)

```

```
(*****)
(*)
(*)      Textfile : TMGR.DIR/T.NEW.TEXT          Volume : TFILES          (*)
(*)      Codefile : T.MGR.CODE ('Include' file) Volume : CATDATA         (*)
(*)
(*)*****
(*) File last modified : Jan 26, 1982              NPROC              (*)
(*)*****
```

(\* create a new test and save on disk \*)

SEGMENT PROCEDURE NEWTEST;

VAR TEXTCODE,

COMMAND : CHAR;

{.....}

(\* returns ptr to unused directory space \*)  
 (\* nil if none available \*)

FUNCTION DIRFREESLOT : INTEGER;  
 VAR FOUND : BOOLEAN;  
 SLOT : INTEGER;

BEGIN (\* dir free slot \*)  
 RESET(FILEDIRECTORY,INDEXNAME);  
 FOUND := FALSE;  
 SLOT := 0;

REPEAT  
 SEEK(FILEDIRECTORY,SLOT);  
 GET(FILEDIRECTORY);  
 IF FILEDIRECTORY^.UNUSED  
 THEN  
 BEGIN (1)  
 FOUND := TRUE;  
 DIRECTORY := FILEDIRECTORY^;  
 END (1)  
 ELSE  
 SLOT := SLOT + 1;  
 UNTIL (FOUND) OR (SLOT > MAXSUBTESTS);

IF FOUND  
 THEN  
 DIRFREESLOT := SLOT  
 ELSE  
 DIRFREESLOT := NIL;  
 CLOSE(FILEDIRECTORY,LOCK);  
 END; (\* dir free slot \*)

{.....}

(\* get the test name \*)

PROCEDURE GETTNAME;

BEGIN

PAGE(OUTPUT);  
 GOTOXY(18,0);  
 WRITE('SUBTEST NAME FORMAT INSTRUCTIONS');  
 GOTOXY(0,2);  
 Writeln(  
 'The first character of the subtest name specifies which screen format the ');  
 Writeln(  
 'question text will appear in. The screen codes are listed below. The ');  
 Writeln(  
 'second character of the subtest name specifies the total permitted time ');  
 Writeln(  
 'in minutes for timed subtests. The third and fourth characters specify ');  
 Writeln(  
 'the additional seconds permitted for timed subtests. Type in the subtest ');  
 Writeln(  
 'name then press <RET>');  
 Writeln;  
 Writeln('\*\*\*' as first char = inverse + 80 columns');

```

        WRITELN('"'@'" as first char = normal + 80 columns');
        WRITELN('"'?''" as first char = normal + 40 columns');
        WRITELN;
        WRITELN(
        'If first character of test name is not any of the above control characters,');
        WRITELN(
        'then the text format will default to inverse + 40 columns.');
```

```

        WRITELN;
        WRITELN;
        WRITELN;
        WRITELN('Enter the subtest name, then press <RET>');
        WRITELN;
        WRITE('----> ');
        READLN(DIRECTORY.TESTNAME);
        END; (* getname *)

BEGIN (* newestest *)
    CURRINDEXRECNUM := DIRFREESLOT;
    IF CURRINDEXRECNUM = NIL
    THEN
        BEGIN (1)
            PAGE(OUTPUT);
            GOTOXY(0,5);
            WRITELN('No room in directory !!!');
            WRITELN;
            STALL;
            EXIT(NEWTTEST);
        END; (1)
    DIRECTORY.UNUSED := FALSE;

    (* give instructions *)
    GETNAME;

    RIGHTMAX := 38;
    SCR80 := FALSE;
    VNORMAL := FALSE;
    TEXTCODE := DIRECTORY.TESTNAME[1];
    CASE TEXTCODE OF
        '*' : BEGIN (2)
            RIGHTMAX := 78;
            SCR80 := TRUE;
            VNORMAL := FALSE;
        END; (2)
        '@' : BEGIN (3)
            RIGHTMAX := 78;
            SCR80 := TRUE;
            VNORMAL := TRUE;
        END; (3)
        '?' : BEGIN (4)
            RIGHTMAX := 38;
            SCR80 := FALSE;
            VNORMAL := TRUE;
        END; (4)
    END; (* cases *)

    WITH DIRINFO(CURRINDEXRECNUM) DO
    BEGIN (5)
        NOTUSED := FALSE;
        TNAME := DIRECTORY.TESTNAME;
        ITEMCOUNT := 0;
    END; (5)
    UPDATEDIRECTORY(CURRINDEXRECNUM);
    FETCHTEST;
END; (* newestest *)
```

```

(*)
(*)
(*)      Textfile : TMGR.DIR/T.DELETE.TEXT      Volume : TFILES      (*)
(*)      Codefile : T.MGR.CODE ('Include' file) Volume : CATDATA      (*)
(*)
(*)
(*)      DEC. 1, 1982      NPROC      (*)
(*)

```

SEGMENT PROCEDURE DELETETEST;

```

VAR I,
    DATASLOT,
    ITEMCNT : INTEGER;
    CHR : CHAR;

BEGIN (* delete test *)
    PAGE(OUTPUT);
    GOTOXY(15,0);
    WRITELN('***** WARNING *****');
    WRITELN;
    WRITELN;
    WRITELN(
'You have selected the ''Delete Subtest'' option. This will purge the subtest');
    WRITELN(
'directory from the database and the itembanks for the subtest will cease to');
    WRITELN(
'exist');
    WRITELN;
    WRITELN;
    WRITE('Do you wish to continue? Press ''N'' or ''Y'' : ');

    IF GETCHAR(['Y','N','y','n'],TRUE,TRUE,TRUE) IN ['N','n']
    THEN
        EXIT(DELETETEST);
    ITEMCNT := 0;
    LOADTEST('Delete which test? : ');
    IF ESCPROC THEN EXIT(DELETETEST);
    PAGE(OUTPUT);
    WRITE('Purge ',directory.testname,' ? Press ''N'' or ''Y'' : ');

    IF GETCHAR(['Y','N','y','n'],TRUE,TRUE,TRUE) IN ['N','n']
    THEN
        EXIT(DELETETEST);
    WRITELN;
    WRITELN;
    WRITE('Deleting');
    FOR I := 0 TO MAXITEMPOOL DO
    BEGIN (1)
        WRITE('.');
        IF DIRECTORY.ITEMCODE[I] >= 0
        THEN
            BEGIN (2)
                ITEMCNT := ITEMCNT + 1;
                DIRECTORY.ITEMCODE[I] := NIL;
            END; (2)
        END; (1)
    DIRECTORY.UNUSED := TRUE;
    UPDATEDIRECTORY(CURRINDEXRECNUM);
    DIRINFO(CURRINDEXRECNUM).NOTUSED := TRUE;
END; (* delete test *)

```

```

(*****)
(*)
(*)      Textfile : TMGR.DIR/T.FLOPPY.TEXT      Volume : TFILES      (*)
(*)      Codefile : T.MGR.CODE ('Include' file) Volume : CATDATA      (*)
(*)
(*)
(*****)
(*) File last modified : Feb 18, 1983      NPROC      (*)
(*****)

(*) This procedure transfers a test directory, data, and text from the 10      (*)
(*) megabyte Corvus hard disc to a 5.5 inch soft floppy disc. This procedure (*)
(*) is needed because the files on the Corvus are too large to fit on a floppy. (*)
(*) Thus we break up the three files of the test question data base into three (*)
(*) smaller files containing information for a single test. *)

SEGMENT PROCEDURE TRANSFERTOSINCH;
VAR I,
    J,
    DATARECNUM,
    FCURRBLOCK,
    FCURRFREEPTR : INTEGER;
    (* current free block *)
    (* current free byte in free block *)

    FILENAME,
    FDIRNAME,
    FDATA,
    FDIRNAME,
    FDATA,
    FTEXTNAME : STRING;
    (* prefix for filenames *)
    (* directory name *)
    (* name of file for data *)
    (* name of file for text *)

    (* directory *)
    FDIR : DIRDATA;
    FDIRFILE : FILE OF DIRDATA;

    (* question data *)
    FDATA : ITEMDATA;
    FDATAFILE : FILE OF ITEMDATA;

    (* question text *)
    FTEXT : FILE;

    (* block sized buffer for ascii & control codes *)
    FITEMBUF : PACKED ARRAY[0..2047] OF 0..139;

    {.....}

    (* This procedure gets a name for the files to be put on the floppy and *)
    (* formats the files for the appropriate data. *)

PROCEDURE FORMATFLOPPY;
VAR NAMEOK : BOOLEAN;
    ERRNUM : INTEGER;

BEGIN (* format floppy *)
    LOADTEST('Write which subtest to floppy? : ');
    IF ESCPROC THEN EXIT(TRANSFERTOSINCH);
    NAMEOK := FALSE;
    PAGE(OUTPUT);

    (* get a filename for the test *)
    REPEAT
        WRITELN('Enter destination filename, then press <RET>');
        WRITELN;
        WRITE('----> ');
        READLN(FILENAME);
        IF FILENAME[1] = CHR(ESC) THEN EXIT(TRANSFERTOSINCH);
        FDIRNAME := CONCAT(FILENAME, '.DIR.DATA');
    (*$)-*)
    RESET(FDIRFILE, FDIRNAME);
    (*$)+*

    IF IORESULT = 0
    THEN
        BEGIN (1)
            WRITE('Destroy old ', FDIRNAME, ' ? Press ''N'' or ''Y'' : ');

```

```

        IF GETCHAR(['Y','y','N','n'],TRUE,TRUE,TRUE) IN ['Y','y']
        THEN
            BEGIN (2)
                CLOSE (FOIRFILE,PURGE);
                REWRITE (FOIRFILE,FOIRNAME);
                NAMEOK := TRUE;
            END; (2)
        WRITELN;
    END (1)
ELSE
    BEGIN (3)
        (*$!-*)
        REWRITE (FOIRFILE,FOIRNAME);
        (*$!+*)
        ERRNUM := IORESULT;
        IF IORESULT <> 0
        THEN
            BEGIN (4)
                WRITELN;
                WRITELN('Cannot open ',FOIRNAME,' IO error #',ERRNUM);
                SQUAWK;
                WRITELN;
                WRITELN;
            END (4)
        ELSE
            NAMEOK := TRUE;
        END; (3)
    UNTIL NAMEOK;

    (* transfer the directory *)
    SEEK (FOIRFILE,0);
    FOIR := DIRECTORY;
    FOIRFILE^ := FOIR;
    PUT (FOIRFILE);
    CLOSE (FOIRFILE,LOCK);

    (* make and format the data and ascii file for the test *)
    FDATAName := CONCAT(FILENAME,'.DATA.DATA');
    FTEXTName := CONCAT(FILENAME,'.TEXT.DATA');
    REWRITE (FOATAFILE,FDATANAME);
    SEEK (FOATAFILE,MAXITEMPool);
    CLOSE (FOATAFILE,LOCK);
    REWRITE (FTEXT,FTEXTNAME);
    ERRNUM := BLOCKWRITE (FTEXT,FITEMBUF,4,0);
    CLOSE (FTEXT,LOCK);
END; (* format floppy *)

[-----]

(* This procedure writes a block of question ascii from the block sized *)
(* buffer to the disk in the ascii file. *)

PROCEDURE FWRITEITEMBLOCK (WHICHBLOCK : INTEGER);
VAR BLOCKSTRANSFERRED,
    ERRNUM : INTEGER;
    BADIO : BOOLEAN;

BEGIN (* furite item block *)
    BADIO := FALSE;
    RESET (FTEXT,FTEXTNAME);
    BLOCKSTRANSFERRED := BLOCKWRITE (FTEXT, FITEMBUF, 4, WHICHBLOCK);
    BADIO := ((BLOCKSTRANSFERRED < 4) OR (IORESULT <> 0));
    ERRNUM := IORESULT;
    CLOSE (FTEXT,LOCK);

    IF BADIO
    THEN
        BEGIN (1)
            WRITELN;WRITELN;
            WRITE('Block write io error # ',ERRNUM);
            WRITELN;
            STALL;
            EXIT (PROGRAM);
        END (1)
    END IF;
END FWRITEITEMBLOCK;

```

```

        END; (1)
END; (* fwriteitemblock *)

{-----}

(* reads a block from disk into the item ascii buffer *)

PROCEDURE FREADITEMBLOCK(WHICHBLOCK : INTEGER);
VAR BLOCKSTRANSFERRED,
    ERRNUM : INTEGER;
    BADIO : BOOLEAN;

BEGIN (* fread item block *)
    BADIO := FALSE;
    RESET(FTEXT,FTEXTNAME);
    BLOCKSTRANSFERRED := BLOCKREAD(FTEXT, FITEMBUF, 4, WHICHBLOCK);
    BADIO := ((BLOCKSTRANSFERRED < 4) OR (IORESULT <> 0));
    ERRNUM := IORESULT;
    CLOSE(FTEXT,LOCK);

    IF BADIO
    THEN
        BEGIN (1)
            WRITELN;WRITELN;
            WRITE('Block read io error # ',ERRNUM);
            WRITELN;
            STALL;
            EXIT(PROGRAM);
        END; (1)
    END; (* fread item block *)

{-----}

(* saves value of free space, block & byte ptr in block 8, bytes 8..3 of *)
(* text file. *)

PROCEDURE FSAVEPTRS;
VAR TRIX : RECORD CASE INTEGER OF
    1 : (TWOBYTES : PACKED ARRAY
        [0..1] OF CHAR);
    2 : (INTVALUE : INTEGER);
END;

BEGIN (* fsave ptrs *)
    FREADITEMBLOCK(8);
    TRIX.INTVALUE := FCURRBLOCK;
    MOVELEFT(TRIX.TWOBYTES(0),FITEMBUF(0),2);
    TRIX.INTVALUE := FCURRFREEPTR;
    MOVELEFT(TRIX.TWOBYTES(0),FITEMBUF(2),2);
    FWRITEITEMBLOCK(8);
END; (* fsave ptrs *)

{-----}

(* This procedure reads in the question text from the ascii file of the *)
(* corvus and block reads it onto the floppy. *)

PROCEDURE ASCIIITOFLOPPY(CBLOCK,CPTR : INTEGER);
VAR CORVUSBLOCK,
    CORVUSPTR : INTEGER;

BEGIN (* ascii to floppy *)
    CORVUSBLOCK := CBLOCK;
    CORVUSPTR := CPTR;
    READITEMBLOCK(CORVUSBLOCK); (* get block where text starts *)
    FREADITEMBLOCK(FCURRBLOCK); (* set buffer to fill *)

    (* read from corvus buffer into floppy buffer, if ptrs reach end *)
    (* of buffer, read in new block/write out full buffer *)
    WHILE TRIX.ASCIIBUF(CORVUSPTR) <> ENDITEM DO
    BEGIN (1)
        FITEMBUF(FCURRFREEPTR) := TRIX.ASCIIBUF(CORVUSPTR);
        FCURRFREEPTR := FCURRFREEPTR + 1;
    END; (1)

```

```

CORVUSPTR := CORVUSPTR + 1;
IF CORVUSPTR > 2047
THEN
  BEGIN (2)
    CORVUSBLOCK := CORVUSBLOCK + 4;
    CORVUSPTR := 0;
    READITEMBLOCK(CORVUSBLOCK);
  END; (2)
IF FCURRFREEPTR > 2047
THEN
  BEGIN (3)
    FWRITEITEMBLOCK(FCURRBLOCK);
    FCURRBLOCK := FCURRBLOCK + 4;
    FCURRFREEPTR := 0;
  END; (3)
END; (1)
FITEMBUF(FCURRFREEPTR) := ENDITEM; (* mark end of text *)
FCURRFREEPTR := FCURRFREEPTR + 1;
FWRITEITEMBLOCK(FCURRBLOCK);
IF FCURRFREEPTR > 2047
THEN
  BEGIN (4)
    FCURRBLOCK := FCURRBLOCK + 4;
    FCURRFREEPTR := 0;
    FWRITEITEMBLOCK(FCURRBLOCK);
  END; (4)
END; (* ascii to floppy *)

(.....)
BEGIN (* transfertoSinch *)
  FORMATFLOPPY;
  FCURRBLOCK := 0;
  FCURRFREEPTR := 4; (* first four bytes reserved 0 - 3 *)
  RESET(FILEITEMINFO,DATANAME);
  RESET(FDATAFILE,FDATANAME);

  (* transfer data, text and update text pointers *)
  PAGE(OUTPUT);
  WRITELN('Transferring');
  J := 1;
  FOR I := 0 TO MAXITEMPOOL DO
  BEGIN (1)
    IF DIRECTORY.ITEMCODE[I] >= 0 (* question exists *)
    THEN
      BEGIN (2)
        WRITE('.');
        IF (J MOD 50) = 0 THEN WRITELN;
        J := J + 1;
        DATARECNUM := HASH(I);
        SEEK(FILEITEMINFO,DATARECNUM);
        GET(FILEITEMINFO);
        ITEMINFO := FILEITEMINFO^;
        FDATA := ITEMINFO; (* transfer the data *)
        FDATA.ITEMBLOCK := FCURRBLOCK; (* set new text ptrs *)
        FDATA.ITEMPTR := FCURRFREEPTR;
        SEEK(FDATAFILE,I);
        FDATAFILE^ := FDATA;
        PUT(FDATAFILE); (* write data to floppy *)

        (* transfer the text *)
        ASCIIIFLOPPY(ITEMINFO.ITEMBLOCK,ITEMINFO.ITEMPTR);
      END; (2)
    END; (1)
  FSAVEPTRS; (* save end of file marker *)
  CLOSE(FILEITEMINFO,LOCK);
  CLOSE(FDATAFILE,LOCK);
END; (* transfertoSinch *)

```

```
(*****
*)
*)      Textfile : TMGR.DIR/T.SEARCH.TEXT      Volume : TFILES
*)      Codefile : T.MGR.CODE ('Include' file)  Volume : CATDATA
*)
*)
*)
*)      File last modified : Feb 18, 1983      NPROC
*)
*)
*)
```

(\* list item text and/or item parameters \*)  
 SEGMENT PROCEDURE SEARCHTEXT;

```
VAR SLOTNUM,
    SCREENBYTES,
    BLK,
    BLKPTR,
    I,
    K,
    NUMKEYS,
    KEYCOUNT,
    DATASLOT : INTEGER;
```

```
DONELIST,
CONSOLE,
CONTINUE,
COMPLETE,
LISTTEXT : BOOLEAN;
```

```
SELECT,
OPT,
COMMAND,
LCOMMAND : CHAR;
```

```
KEYWORD : ARRAY[1..10] OF STRING;
```

```
ALREADYFOUND : ARRAY[1..10] OF BOOLEAN;
```

```
RESULTS : ARRAY[0..MAXITEMPOOL] OF INTEGER;
```

```
TEXTLINE,
KEYSTR : STRING;
```

```
{.....}
(* reads the item text file & displays item text *)
PROCEDURE SCANQUEST(BLOCKNUM,BLOCKPTR : INTEGER);
CONST MAXBUFSIZE = 2047;
      BLOCKSOUT = 4;
```

```
VAR X,
    Y,
    B,
    CURRPTR,
    CURRBLK,
    CHARCODE,
    CHARCNT : INTEGER;
```

```
BADIO : BOOLEAN;
```

```
{-----}
```

```
(* return the next code in ascii file *)
```

```
FUNCTION BUFCODE : INTEGER;
```

```
BEGIN
```

```
  BUFCODE := TRIX.ASCIIIBUF(CURRPTR);
```

```
  CURRPTR := CURRPTR + 1;
```

```
  IF CURRPTR > MAXBUFSIZE THEN
```

```
    (* end of block/get next block and reset byte ptr *)
```

```
    BEGIN (1)
```

```

CURRBLK := CURRBLK + BLOCKSOUT;
READITEMBLOCK(CURRBLK);
CURRPTR := 0;
END; (1)
END; (* bufcode *)

```

{.....}

```

BEGIN (* scanquest *)

```

```

FOR B := 1 TO 10 DO
  ALREADYFOUND(B) := FALSE;

```

```

READITEMBLOCK(BLOCKNUM);
(* set block/byte ptrs *)
CURRPTR := BLOCKPTR;
CURRBLK := BLOCKNUM;
FILLCHAR(LINEBUF[0],80,' ');
(* read bytes from the buffer *)
REPEAT

```

```

  (* get char from block buffer *)
  CHARCODE := bufcode;

```

```

CASE CHARCODE OF

```

```

  GOTOFLAG : BEGIN (1)      (* move cursor *)
    (* next two bytes after flag are x,y coord *)
    X := BUFCD;
    Y := BUFCD;
    CHARCNT := BUFCD;
    IF (CURRPTR + CHARCNT - 1) > MAXBUFSIZE THEN

```

```

      BEGIN (2)
        B := (MAXBUFSIZE + 1) - CURRPTR;
        MOVELEFT(TRIX.ASCIIBUF(CURRPTR),LINEBUF[X],B);
        X := X + B;
        B := CHARCNT - B;
        CURRBLK := CURRBLK + BLOCKSOUT;
        READITEMBLOCK(CURRBLK);
        CURRPTR := 0;
        MOVELEFT(TRIX.ASCIIBUF(CURRPTR),LINEBUF[X],B);
        CURRPTR := CURRPTR + B;

```

```

      END (2)

```

```

    ELSE

```

```

      BEGIN (3)
        MOVELEFT(TRIX.ASCIIBUF(CURRPTR),LINEBUF[Y],CHARCNT);
        CURRPTR := CURRPTR + CHARCNT;
        IF CURRPTR > MAXBUFSIZE THEN

```

```

          BEGIN (4)
            CURRBLK := CURRBLK + BLOCKSOUT;
            CURRPTR := 0;
            READITEMBLOCK(CURRBLK);
            END; (4)

```

```

          END; (3)

```

```

        MOVELEFT(LINEBUF[0],TEXTLINE[1],80);

```

```

        FOR K := 1 TO NUMKEYS DO

```

```

          BEGIN

```

```

            KEYSTR := KEYWORD[K];
            IF POS(KEYSTR,TEXTLINE) <> 0 THEN
              BEGIN

```

```

                IF NOT ALREADYFOUND(K) THEN

```

```

                  BEGIN

```

```

                    KEYCOUNT := KEYCOUNT + 1;

```

```

                    ALREADYFOUND(K) := TRUE;

```

```

                  END;

```

```

                END;

```

```

            END;

```

```

            FILLCHAR(LINEBUF[0],80,' ');

```

```

          END; (1)

```

```

        PAGEFLAG : ;

```

```

        ENDITEM : ;

```

```

END;

```

```
UNTIL CHARCODE = ENDITEM; (* until end flag hit *)
END; (* scanquest *)
```

```

{-----}

(* reads item text file & displays item text to printer or file *)
PROCEDURE LISTPRINT(BLOCKNUM, BLOCKPTR : INTEGER);
VAR X,
    Y,
    OLDY,
    CURRPTR,
    CURRBLK,
    SCREENBYTES,
    CHARCODE,
    SKIPBYTE : INTEGER;

{.....}

(* returns next code in file *)
FUNCTION LBUFCODE : INTEGER;
BEGIN
    LBUFCODE := TRIX.ASCII[BUF(CURRPTR)];
    CURRPTR := CURRPTR + 1;
    IF CURRPTR > 2847 THEN
        BEGIN (1)
            CURRBLK := CURRBLK + 4;
            READITEMBLOCK(CURRBLK);
            CURRPTR := 8;
        END; (1)
    END; (* lbufcode *)
{.....}

BEGIN (* listprint *)
    SCREENBYTES := (XSCREEN + 1) * (YSCREEN + 1);
    FILLCHAR(SCREEN[0], SCREENBYTES, ' ');
    OLDY := TOPMAX;
    READITEMBLOCK(BLOCKNUM);
    CURRPTR := BLOCKPTR;
    CURRBLK := BLOCKNUM;
    REPEAT
        CHARCODE := LBUFCODE;
        CASE CHARCODE OF
            GOTOFLAG : BEGIN (1)
                X := LBUFCODE;
                Y := LBUFCODE;
                (* ignore next byte, due to a file modification *)
                SKIPBYTE := LBUFCODE;
                WHILE OLDY < Y DO
                    BEGIN (2)
                        Writeln(DEST);
                        OLDY := OLDY + 1;
                    END; (2)
                WRITE(DEST, ' ' : X);
            END; (1)
            PAGEFLAG : BEGIN (3)
                Writeln(DEST);
                Writeln(DEST);
                Writeln(DEST);
                OLDY := TOPMAX;
            END; (3)
        ENDITEM : ;
    END; (* cases *)
    IF (CHARCODE >= 32) AND (CHARCODE <= 126) THEN
        BEGIN (4)
            SCREEN[X,Y] := CHR(CHARCODE);
            X := X + 1;
            WRITE(DEST, CHR(CHARCODE));
        END; (4)

```

```

UNTIL CHARCODE = ENDITEM;
END; (* print *)

(-----)

(* lists things to the console *)
PROCEDURE LCONSOLE;
VAR FIXCHAR : CHAR;
    GRAF : BOOLEAN;
BEGIN
    DECODEPRINT(BLK,BLKPTR);
    GOTOXY(8,20);
    IF SLOTNUM > MAXSAMPLES THEN
        BEGIN (3)
            WRITE('Item code : ',DIRECTORY.ITEMCODE(SLOTNUM));
            GOTOXY(8,21);
            WRITE('Answer : ');
            CASE ITEMINFO.ATYPE OF
                CHARVALUE : WRITELN(' ',ITEMINFO.ANSWER);
                INTVALUE : WRITELN(' ',ITEMINFO.INTANSWER);
                SEVENCHR : BEGIN
                    FOR I := 1 TO ITEMINFO.ANSWERCOUNT DO
                        WRITE(' ',ITEMINFO.CHANSWER[I]);
                    WRITELN;
                END;
            END; (* cases *)
            GOTOXY(8,23);
            WRITE('Press <RET> to continue, <ESC> to quit ');
            IF GETCHAR([CHR(RET),CHR(ESC)],TRUE,TRUE,TRUE) = CHR(ESC) THEN
                BEGIN (5)
                    CLOSE(FILEITEMINFO,LOCK);
                    EXIT(SEARCHTEXT);
                END (4)
            END;
        END; (* lconsole *)
    (-----)

    (* lists item text and data to file/printer *)
    PROCEDURE LFILE;
    BEGIN
        IF SLOTNUM > MAXSAMPLES THEN
            BEGIN (2)
                WRITELN(DEST,' Item code : ',DIRECTORY.ITEMCODE(SLOTNUM));
                WRITELN(DEST);
                WRITELN(DEST,' A parameter : ',ITEMINFO.A);
                WRITELN(DEST,' B parameter : ',ITEMINFO.B);
                WRITELN(DEST,' C parameter : ',ITEMINFO.C);
                WRITELN(DEST);WRITELN(DEST);
            END; (2)
            LISTPRINT(BLK,BLKPTR);
            WRITELN(DEST);
            WRITELN(DEST);
            IF SLOTNUM > MAXSAMPLES THEN
                BEGIN (3)
                    WRITE(DEST,' Answer(s) : ');
                    CASE ITEMINFO.ATYPE OF
                        CHARVALUE : WRITELN(DEST,ITEMINFO.ANSWER);
                        INTVALUE : WRITELN(DEST,ITEMINFO.INTANSWER);
                        SEVENCHR : BEGIN (4)
                            FOR I := 1 TO ITEMINFO.ANSWERCOUNT DO
                                WRITE(DEST,ITEMINFO.CHANSWER[I],' ');
                            WRITELN(DEST);
                        END; (4)
                    END; (* cases *)
                    WRITELN(DEST);
                END; (3)
                FOR I := 1 TO 80 DO
                    WRITE(DEST,'-');
                WRITELN(DEST);WRITELN(DEST);
            END; (* lfile *)
        (-----)

```

```

PROCEDURE GETSEARCHINFO;
BEGIN
  PAGE(OUTPUT);
  GOTOXY(20,0);
  WRITE('ENTER KEYWORDS TO SEARCH FOR');
  WRITELN;
  REPEAT
    WRITELN;
    WRITELN(
      'You may have up to 10 keywords. How many keywords would you like to enter?');
    WRITELN;
    WRITE(
      'Enter # of key words and then press <RET> : ');
    READLN(NUMKEYS);
    IF NUMKEYS > 10 THEN SQUAWK;
    IF NUMKEYS <= 0 THEN
      EXIT(SEARCHTEXT);
    UNTIL NUMKEYS <= 10;

    WRITELN;
    WRITELN;
    WRITELN(
      '***** Enter your keyword and then press <RET> *****');
    WRITELN;
    FOR I := 1 TO NUMKEYS DO
    BEGIN
      WRITELN;
      WRITE('Keyword ',I,' : ');
      READLN(KEYSTR);
      KEYWORD[I] := KEYSTR;
    END;

    PAGE(OUTPUT);
    GOTOXY(20,0);
    WRITE('OUTPUT SELECT MENU');
    GOTOXY(0,4);
    WRITE('Select one of the following options by entering its number. ');
    GOTOXY(16,8);
    WRITE('1. QUIT');
    GOTOXY(16,9);
    WRITE('2. SEARCH RESULTS TO CONSOLE');
    GOTOXY(16,10);
    WRITE('3. SEARCH RESULTS TO PRINTER');
    GOTOXY(16,11);
    WRITE('4. SEARCH RESULTS TO FILE');
    GOTOXY(16,18);
    WRITE('Enter Choice # : ');
    SELECT := GETCHAR(['1'..'4'],TRUE,TRUE,TRUE);
    CONSOLE := FALSE;

    CASE SELECT OF
      '1' : EXIT(SEARCHTEXT);
      '2' : CONSOLE := TRUE;
      '3' : REWRITE(DEST,UNITNUMPRINTER);
      '4' : GETNEWFILE;
    END;
  END; (* get searchinfo *)

  (.....)

BEGIN (* searchtext *)

  (* get the subtest you want to search *)
  LOADTEST('Search text in which subtest? : ');

  IF ESCPROC THEN EXIT(SEARCHTEXT);

  TEXTLINE :=
  ,
  FOR I := 0 TO MAXITEMPOOL DO

```

```

RESULTS[] := 0;

GETSEARCHINFO;
PAGE(OUTPUT);
WRITE('Searching');

SLOTNUM := MAXSAMPLES + 1;
RESET(FILEITEMINFO,DATANAME);

REPEAT
  IF DIRECTORY.ITEMCODE(SLOTNUM) >= 0 THEN
    BEGIN (10)
      WRITE('.');
      DATASLOT := HASH(SLOTNUM);
      SEEK(FILEITEMINFO,DATASLOT);
      GET(FILEITEMINFO);
      ITEMINFO := FILEITEMINFO;
      BLK := ITEMINFO.ITEMBLOCK;
      BLKPTR := ITEMINFO.ITEMPTR;

      IF NOT ITEMINFO.GRAPHICS THEN
        BEGIN
          KEYCOUNT := 0;
          SCANQUEST(BLK,BLPTR);
          RESULTS(SLOTNUM) := KEYCOUNT;
        END;
      END; (10)
      SLOTNUM := SLOTNUM + 1;
    UNTIL (SLOTNUM > MAXITEMPOOL);

    PAGE(OUTPUT);
    FOR K := 1 TO NUMKEYS DO
      BEGIN
        WRITELN;
        WRITE(
          '***** Questions which contained ',K,' key(s) *****');
        WRITELN;
        WRITELN;
        FOR I := 0 TO MAXITEMPOOL DO
          BEGIN
            IF RESULTS[I] = K THEN
              WRITE(DIRECTORY.ITEMCODE[I], ' ');
            END;
            WRITELN;
            WRITELN;
            STALL;
            WRITELN;
            WRITELN;
          END;

        IF NOT (CONSOLE) THEN
          CLOSE(DEST,LOCK);
        END; (* listitems *)

```

**EMGR.DIR:**  
**Subdirectory - Examinee Manager Textfiles**



```
(*S+*)
(*-----*)
(*      Textfile : EMGR.DIR/E.MGR.TEXT          Volume : TFILES      *)
(*      Codefile : E.MGR.CODE                   Volume : CATDATA     *)
(*-----*)
(*                      VERSION 1.03                      NPROC      *)
(*-----*)
(* File last modified :   Feb 28, 1983                  *)
(*-----*)
(* Functions : 1) allows access to examinee records.      *)
(*              2) lists examinee's test scores.          *)
(*              3) removing, or modifying an examinee record. *)
(*              4) allows examinee access to system by specifying who can *)
(*                  enter the cat system.                  *)
(*              5) lists the status of all examinees in the system. *)
(*              6) allows data entry of examinee records  *)
(*-----*)
(*                      Program Modification History          *)
(*-----*)
(*      DATE                      CHANGE                      *)
(*-----*)
(*      1 / 4 / 83                Personal data record changed, files reformatted. *)
(*                                New fields include branch of service, post ASVAB *)
(*                                test scores, and subtest order. Designated soft- *)
(*                                ware version changed from 1.01 to 1.02.          *)
(*      1 / 13 / 83              Data verification sequence appears after entry of *)
(*                                personal data for 3 fields : 1. Last Name,      *)
(*                                2. ASVAB Scores, and 3. Rating/MOS.              *)
(*-----*)
```

PROGRAM PERSONMGR;  
USES CHAINSTUFF;

```
CONST (* ascii values *)
  BELL = 7;
  NUL = 0;
  LARROW = 8;
  RARROW = 21;
  RET = 13;
  ESC = 27;
  SPACE = 32;
  ASCIIOFFSET = 48; (* ascii zero *)

  NIL = -1;

  (* available space in directory *)
  MAXEXAMINEE = 50;

  ZINDEXNAME = 'CATDATA:EINDEX.DATA';
  ZINFONAME = 'CATDATA:EINFO.DATA';
  ZRESULTS = 'CATDATA:ERESULTS.DATA';

  (* examinee personal data files *)
  ZPINFONAME = 'CATDATA:EPDATA.DATA';

  DONEINDEX = 'CATDATA:DONEDIR.DATA';
  DONEINFO = 'CATDATA:DONEINFO.DATA';
  DONERESULTS = 'CATDATA : DONERSLTS.DATA';
  DONEPINFO = 'CATDATA : DONEEPD.DATA';

  (* output file for test scores *)
  DEFAULTFILE = 'CATDATA:EXAMINEE.DATA';

  (* maximum # of questions per subtest *)
  QUESTIONS = 20;
```

```
(* maximum # of subtests per examinee *)
STESTS = 20;
```

```
(* subtest directory *)
TINDEXNAME = 'CATDATA:TESTINDEX.DATA';
```

```
MAXITEMPOOL = 300;
```

```
(* maximum allowable subtests given *)
GMAXSUBTEST = 20;
```

```
(* maximum spaces in directory *)
MAXSUBTESTS = 20;
```

```
(* printer unit number *)
UNITNUMPRINTER = 'PRINTER:';
```

```
VERSION = '[1.03]';
```

```
TYPE (* test directory *)
DIRDATA = PACKED RECORD
    UNUSED      : BOOLEAN;
    TESTNAME    : STRING;
    ITEMCODE    : PACKED ARRAY
                  (0..MAXITEMPOOL)
                  OF INTEGER;
END;
```

```
(* social security # *)
IDTYPE = PACKED ARRAY(0..8) OF CHAR;
```

```
(* coding speed answer *)
SEVENTYPE = PACKED ARRAY(1..7) OF CHAR;
```

```
(* response types *)
ITEMRESPONSES = (CHARVALUE, INTVALUE, SEVENCHR);
```

```
SETOFCHAR = SET OF CHAR;
```

```
(* examinee directory *)
INDEX = PACKED ARRAY(0..MAXEXAMINEE) OF PACKED RECORD
```

```
    (* true ==> trecord available *)
    UNUSED : BOOLEAN;
```

```
    (* social security/id key *)
    ID : IDTYPE;
END;
```

```
(* examinee pre-testing data *)
EXAMEINFO = PACKED RECORD
```

```
    (* social security # *)
    ID : IDTYPE;
```

```
    ORIENTATIONTIME,
    PREVTIMELASTTEST,
    (* number of proctor calls *)
    NUMPROC,
```

```
    (* total time spent at computer *)
    TOTTIMECONSOLE,
```

```
    (* number of key in errors *)
    NUMERRORS,
```

```
    (* # of last test taken - 1, eg.- if on test 5 then *)
    (* this variable holds a value of 4. *)
    LASTTEST : INTEGER;
```

```
    (* date of log in *)
```

```

DATE          : PACKED ARRAY[0..5] OF CHAR;

(* time at log in *)
TIME          : PACKED ARRAY[0..3] OF CHAR;

(* testing configuration given to this examinee *)

(* record # of subtest directories *)
TESTORDER,

(* adaptive strategy *)
STRATEGY,

(* # of questions per test *)
TESTLENGTH   : PACKED ARRAY[1..GMAXSUBTEST]
              OF 0..128;

(* initial variance for each test *)
CKERROR      : ARRAY[1..GMAXSUBTEST] OF REAL;

(* flags to control flow of subtests *)
SUBSTOP      : PACKED ARRAY[1..GMAXSUBTEST] OF BOOLEAN;

END;

(* examinee personal data *)
PINFOREC = RECORD
  LASTNAME : PACKED ARRAY[0..14] OF CHAR;
  FIRSTNAME : PACKED ARRAY[0..11] OF CHAR;
  MINIMAL : CHAR;
  CURRADDRESS,
  HOMEOFREC : PACKED ARRAY[0..1] OF CHAR;
  CITIZENSHIP : PACKED ARRAY[0..3] OF CHAR;
  SEX : CHAR;
  POPGROUP : PACKED ARRAY[0..4] OF CHAR;
  ETHNIC : PACKED ARRAY[0..1] OF CHAR;
  MARITAL : CHAR;
  DEPENDANTS : PACKED ARRAY[0..1] OF CHAR;
  BIRTHDATE : PACKED ARRAY[0..7] OF CHAR;
  EDUCATION : PACKED ARRAY[0..2] OF CHAR;
  TESTID : PACKED ARRAY[0..2] OF CHAR;
  AFOT : PACKED ARRAY[0..1] OF CHAR;
  ASVAB : PACKED ARRAY[0..43] OF CHAR;
  ENLISTDATE,
  ACTSERDATE : PACKED ARRAY[0..7] OF CHAR;
  ENL : PACKED ARRAY[0..4] OF CHAR;
  AFEES : PACKED ARRAY[0..1] OF CHAR;
  BOS : PACKED ARRAY[0..1] OF CHAR;
  POSTASYAB : PACKED ARRAY[0..43] OF CHAR;
  STESTORDER : PACKED ARRAY[0..59] OF CHAR;
END;

(* question scores , data on examinee with respect to question *)
ITEM = PACKED RECORD

  ACORRECT : PACKED ARRAY[0..6] OF BOOLEAN;
  ACOUNT,

  (* which question he took, code # *)
  ITEMNUM : INTEGER;

  (* true ==> answered it correctly *)
  CORRECT : BOOLEAN;

  (* ability after answering this question *)
  THETA,

  (* variance after answering this question *)
  ERROR,

  (* time spent answering this question *)
  LATENCY : REAL;

```

```

(* how he answered the question *)
CASE RTYPE : ITEMRESPONSES OF
  CHARVALUE : (RESPONSE : CHAR);
  INTVALUE : (INTRESPONSE : INTEGER);
  SEVENCHR : (CHRESPONSE : SEVENTYPE);
END;

(* test scores of examinee results *)
SUBTEST = PACKED RECORD

  STTIME,
  STINSTTIME,
  STPROCTCALLS,
  MOOSTTIME : INTEGER;

  (* number of questions he answered *)
  NUMITEMS,

  (* # of correct responses *)
  NUMCORR : 0..128;

  (* final estimate of ability *)
  ESTABILITY,

  (* final variance of ability *)
  VARIANCE : REAL;

  (* results on question level *)
  ITEMINFO : PACKED ARRAY[0..QUESTIONS] OF ITEM;
END;

VAR (* file names *)
  PINFONAME,
  INDEXNAME,
  INFOFNAME,
  RESULTS : STRING;

  BACKUP : BOOLEAN;

  LETTERS,DIGITS,CHARACTERS : SET OF CHAR;
  OUTPUT,
  COMMAND : CHAR;

  EXAMINEE : EXAMEINFO;
  FILEEXAMINEE : FILE OF EXAMEINFO;

  DIR : INDEX;
  FILEDIR : FILE OF INDEX;

  TESTS : SUBTEST;
  FILETESTS : FILE OF SUBTEST;

  (* test directory *)
  DIRECTORY : DIRDATA;
  FILEDIRECTORY : FILE OF DIRDATA;

  (* examinee personal data *)
  PINFO : PINFOREC;
  PINFOFILE : FILE OF PINFOREC;

  (* output file for test results *)
  DEST : TEXT;

  (* string buffer *)
  LINEBUF : PACKED ARRAY[0..79] OF CHAR;

PROCEDURE PAGE(DUMMY : CHAR); FORWARD;
PROCEDURE TOPOFFORM; FORWARD;
PROCEDURE SQUAWK; FORWARD;
PROCEDURE BLANKLINES(START,COUNT,ENDCURSOR : INTEGER); FORWARD;

```

```

FUNCTION GETCHAR(OKSET : SETOFCHAR;
                 FLUSHQUEUE,ECHO,BEEP : BOOLEAN) : CHAR; FORWARD;
PROCEDURE STALL; FORWARD;
PROCEDURE FILLBUF(CHARCNT : INTEGER;
                 OKSET : SETOFCHAR; ERASE : BOOLEAN); FORWARD;
PROCEDURE GETNEWFILE; FORWARD;
PROCEDURE SCRCONTROL(I,J,K : INTEGER); FORWARD;
PROCEDURE TEXT40MODE; FORWARD;
PROCEDURE TEXT80MODE; FORWARD;
PROCEDURE INVERSE; FORWARD;
PROCEDURE NORMAL; FORWARD;
PROCEDURE LOADPDATA(RECORDNUM : INTEGER); FORWARD;
PROCEDURE SAVEPDATA(RECORDNUM : INTEGER); FORWARD;
PROCEDURE LOADINDEX; FORWARD;
PROCEDURE LOADEXAMINEE(RECNUM : INTEGER); FORWARD;
PROCEDURE UPDATEEXAMINEE(RECNUM : INTEGER); FORWARD;
PROCEDURE UPDATEINDEX; FORWARD;
PROCEDURE LOADRESULTS(RECNUM : INTEGER); FORWARD;
PROCEDURE UPDATERESULTS(RECNUM : INTEGER); FORWARD;
PROCEDURE INITEREC; FORWARD;
FUNCTION DIRINDEXNUM(IONUM : IDTYPE) : INTEGER; FORWARD;
PROCEDURE ENTERID; FORWARD;

```

```

(* utility subroutines *)
(*$! /TFILES/EMGR.DIR/E.UTL.TEXT *)

```

```

(* disk io routines *)
(*$! /TFILES/EMGR.DIR/E.IO.TEXT *)

```

```

(* examinee manager subroutines *)
(*$! /TFILES/EMGR.DIR/E.SUBRT.TEXT *)

```

```

(* log - in examinee routines *)
(*$! /TFILES/EMGR.DIR/E.LOGIN.TEXT *)

```

```

(* list status of examinees in directory *)
(*$! /TFILES/EMGR.DIR/E.STATUS.TEXT *)

```

```

(* list examinee file data *)
(*$! /TFILES/EMGR.DIR/E.SUMMARY.TEXT *)

```

```

(* remove an examinee from directory *)
(*$! /TFILES/EMGR.DIR/E.DELETE.TEXT *)

```

```

(* fetch examinee routines *)
(*$! /TFILES/EMGR.DIR/E.FETCH.TEXT *)

```

```

(* set up files/directory *)
(*$! /TFILES/EMGR.DIR/E.ZERO.TEXT *)

```

```

(* end of day routines *)
(*$! /TFILES/EMGR.DIR/E.ENDOFDAY.TEXT *)

```

```

{.....}

```

```

PROCEDURE MENU;
VAR X,Y : INTEGER;
BEGIN
  PAGE(OUTPUT);
  GOTOXY(18,0);
  WRITE('EXAMINEE MANAGER MENU ',VERSION);
  GOTOXY(0,4);
  WRITE('Select one of the following procedures by entering its number. ');
  X := 16;
  Y := 8;
  GOTOXY(X,Y);
  WRITE('1. QUIT');
  GOTOXY(X,Y+1);
  WRITE('2. LOG EXAMINEE INTO SYSTEM');
  GOTOXY(X,Y+2);
  WRITE('3. ENTER EXAMINEE PERSONAL DATA');
  GOTOXY(X,Y+3);
  WRITE('4. VIEW EXAMINEE RECORDS');

```

```

GOTOXY(X,Y+4);
WRITE('5. LIST DIRECTORY');
GOTOXY(X,Y+5);
WRITE('6. SEPARATE DONE/NOT DONE EXAMINEES');
GOTOXY(X,Y+6);
WRITE('7. SELECT FILES TO MANAGE');
GOTOXY(X,Y+7);
WRITE('8. REMOVE EXAMINEE');
GOTOXY(X,Y+8);
WRITE('9. PURGE DIRECTORY');
GOTOXY(0,6);
WRITE('Currently managing ');
INVERSE;
IF BACKUP THEN
    WRITE('DONE EXAMINEE')
ELSE
    WRITE('SESSION');
NORMAL;
WRITE(' files. ');
GOTOXY(X,Y+11);
WRITE('Enter Choice # : ');
END; (* menu *)

```

-----)

```

(* specify which files you want to look at *)
PROCEDURE FILESPECIFY;
VAR FCOMMAND : CHAR;
BEGIN
    PAGE(OUTPUT);
    (*$1-*)
    RESET(FILEDIR,DONEINDEX);
    (*$1+*)
    IF IORESULT <> 0 THEN
        BEGIN (1)
            WRITELN;
            WRITELN('Back-up files do not exist. ');
            WRITELN;
            STALL;
            EXIT(FILESPECIFY);
        END (1)
    ELSE
        BEGIN (2)
            CLOSE(FILEDIR,NORMAL);
            GOTOXY(20,0);
            WRITE('SPECIFY FILES MENU');
            GOTOXY(0,4);
            WRITE('Select one of the following options by entering its number. ');
            GOTOXY(16,9);
            WRITE('1. QUIT');
            GOTOXY(16,10);
            WRITE('2. MANAGE SESSION FILES');
            GOTOXY(16,11);
            WRITE('3. MANAGE DONE EXAMINEES');
            REPEAT
                GOTOXY(0,6);
                WRITE('You currently have option : ');
                IF BACKUP THEN
                    WRITE('3')
                ELSE
                    WRITE('2');
                INVERSE;
                IF BACKUP THEN
                    BEGIN (3)
                        GOTOXY(16,11);
                        WRITE('3. MANAGE DONE EXAMINEES');
                    END (3)
                ELSE
                    BEGIN (4)
                        GOTOXY(16,10);
                        WRITE('2. MANAGE SESSION FILES');
                    END (4)
            UNTIL FALSE;
            NORMAL;
        END (2)
    END;
END;

```

```

GOTOXY(16,15);
WRITE(' ');
GOTOXY(16,15);
WRITE('Enter Choice # : ');
FCOMMAND := GETCHAR(['1'..'3'],TRUE,TRUE,TRUE);
IF BACKUP THEN
BEGIN (5)
GOTOXY(16,11);
WRITE('3. MANAGE DONE EXAMINEES');
END (5)
ELSE
BEGIN (6)
GOTOXY(16,10);
WRITE('2. MANAGE SESSION FILES');
END (6)
CASE FCOMMAND OF
'1' : EXIT(FILESPECIFY);
'2' : BEGIN (7)
INDEXNAME := ZINDEXNAME;
INFONAME := ZINFONAME;
RESULTS := ZRESULTS;
PINFONAME := ZPINFONAME;
BACKUP := FALSE;
END (7)
'3' : BEGIN (8)
INDEXNAME := DONEINDEX;
INFONAME := DONEINFO;
RESULTS := DONERESULTS;
PINFONAME := DONEPINFO;
BACKUP := TRUE;
END (8)
END (* cases *)
UNTIL FCOMMAND = '1';
END (2)
END (* filespecify *)

(.....)

BEGIN (* main program *)
PAGE(OUTPUT);
DIGITS := ['0'..'9'];
LETTERS := ['A'..'Z','a'..'z'];
CHARACTERS := [CHR(32)..CHR(126)];
FILLCHAR(LINEBUF(0),80,' ');

(* files required *)
INDEXNAME := ZINDEXNAME;
INFONAME := ZINFONAME;
RESULTS := ZRESULTS;
PINFONAME := ZPINFONAME;
BACKUP := FALSE;

REPEAT
MENU;
COMMAND := GETCHAR(['1'..'9'],TRUE,TRUE,TRUE);
CASE COMMAND OF
'1' : ;
'2' : BEGIN (1)
INDEXNAME := ZINDEXNAME;
INFONAME := ZINFONAME;
RESULTS := ZRESULTS;
PINFONAME := ZPINFONAME;
LOGINEXAMINEE;
IF BACKUP THEN
BEGIN (2)
INDEXNAME := DONEINDEX;
INFONAME := DONEINFO;
RESULTS := DONERESULTS;
PINFONAME := DONEPINFO;
END (2)
END (1)
'3' : ENTERDATA;

```

```
'4' : ESUMMARY;
'5' : ESTATUS;
'6' : BEGIN {3}
      ENDOFDAY;
      IF BACKUP THEN
      BEGIN {4}
        INDEXNAME := DONEINDEX;
        INFONAME := DONEINFO;
        RESULTS := DONERESULTS;
        PINFONAME := DONEPINFO;
      END; {4}
    END; {3}
'7' : FILESPECIFY;
'8' : DELETEEXAMINEE;
'9' : ZERO DIRECTORY;
END; (* cases *)
UNTIL COMMAND = '1';
PAGE (OUTPUT);
GOTOXY(15,10);
WRITE('Loading Catproject driver...');
SETCHAIN('CATDATA:CATPROJECT');

END.
```

```

(*****)
(*)
(*)   Textfile : EMGR.DIR/E.UTL.TEXT           Volume : TFILES          (*)
(*)   Codefile : E.MGR.CODE ('Include' file)   Volume : CATDATA         (*)
(*)
(*****)
(*)           DEC. 1, 1982                     NPROC                      (*)
(*****)

(* clear the screen *)
PROCEDURE PAGE;
BEGIN

    (* for apple 2 *)
    WRITE(CHR(12));

    (* for apple 3 *)
    WRITE(CHR(28));
    GOTOXY(0,0);
END; (* page *)

(-----)

(* form feeds the printer *)
PROCEDURE TOPOFFORM;
BEGIN
    REWRITE(DEST,UNITNUMPRINTER);
    WRITE(DEST,CHR(12));
    CLOSE(DEST,NORMAL);
END; (* top of form *)

(-----)

(*** rings the bell ***)
PROCEDURE SQUAWK;
BEGIN
    WRITE(CHR(BELL));
END; (* squawk *)

(-----)

(*** blank out lines ***)
(* given a y location to begin, # of lines to erase, which line *)
(* to leave cursor. erases only 40 column width. *)
PROCEDURE BLANKLINES;
VAR I : INTEGER;
BEGIN
    GOTOXY(0,START);
    FOR I := 1 TO (COUNT-1) DO
        WRITELN(' ' : 39);
    WRITE(' ' : 39);
    GOTOXY(0,ENDCURSOR);
END; (* blanklines *)

(-----)

(* read an acceptable character from the keyboard *)
(* given a set of acceptable characters to read. *)
(* and flags if you want computer to flush the *)
(* type ahead buffer, beep if a bad key is pressed *)
(* or echo the character pressed. *)
FUNCTION GETCHAR;
VAR MASK : PACKED ARRAY[0..0] OF CHAR;
BEGIN
    IF FLUSHQUEUE THEN UNITCLEAR(2); (* flush buffer *)
    REPEAT
        UNITREAD(2,MASK,1);
        IF BEEP AND NOT (MASK[0] IN OKSET) THEN SQUAWK;
    UNTIL MASK[0] IN OKSET;
    IF ECHO AND (MASK[0] IN [CHR(32)..CHR(126)]) THEN
        WRITE(MASK[0]);
    GETCHAR := MASK[0];
END; (* getchar *)

```

-----)

(\*~~xxxx~~ display a message/wait for a keystroke ~~xxxx~~\*)

PROCEDURE STALL;

VAR STALLCHAR : CHAR;

BEGIN

WRITE('Press <RET> to continue ');

STALLCHAR :=

GETCHAR([CHR(RET),CHR(ESC)],TRUE,FALSE,TRUE);

IF STALLCHAR = CHR(ESC) THEN EXIT(PROGRAM);

END; (\* stall \*)

-----)

(\* read in a string and save in a temporary buffer \*)

(\* allows control on what characters may be typed \*)

(\* and the number of characters typed. \*)

PROCEDURE FILLBUF;

VAR I : INTEGER;

IDCHAR : CHAR;

BEGIN

I := 0;

REPEAT

IF I > (CHARCNT-1) THEN

IDCHAR :=

GETCHAR([CHR(LARROW),CHR(RET)],TRUE,TRUE,TRUE)

ELSE

BEGIN (1)

IDCHAR :=

GETCHAR([OKSET + [CHR(RET),  
CHR(LARROW),CHR(RARROW)],  
TRUE,TRUE,TRUE);

IF IDCHAR IN OKSET THEN

BEGIN (2)

LINEBUF[I] := IDCHAR;

I := I + 1;

END; (2)

END; (1)

IF IDCHAR = CHR(LARROW) THEN

BEGIN (3)

IF I = 0 THEN

SQUAWK

ELSE

BEGIN (4)

WRITE(CHR(LARROW));

I := I - 1;

IF ERASE THEN

BEGIN (5)

WRITE(' ');

WRITE(CHR(LARROW));

LINEBUF[I] := ' ';

END; (5)

END; (4)

END; (3)

ELSE

IF IDCHAR = CHR(RARROW) THEN

BEGIN (6)

WRITE(LINEBUF[I]);

I := I + 1;

END; (6)

UNTIL IDCHAR = CHR(RET);

END; (\* fillbuf \*)

-----)

(\*~~xxxx~~ open a new text file ~~xxxx~~\*)

PROCEDURE GETNEWFILE;

VAR FILENAME : STRING;

ERRNUM : INTEGER;

(.....)

```

(*get a legal filename *)
FUNCTION NAMEOK : BOOLEAN;
VAR I : INTEGER;
BEGIN
  IF FILENAME = ''
  THEN BEGIN (1)
    FILENAME := DEFAULTFILE;
    GOTOXY(44,0);
    WRITE(FILENAME);
  END (1)
  ELSE IF FILENAME[1] = CHR(esc) THEN EXIT(PROGRAM);
  IF (POS('.TEXT',FILENAME) <> (LENGTH(FILENAME) - 4)) OR
    (LENGTH(FILENAME) < 6 )
  THEN FILENAME := CONCAT(FILENAME, '.TEXT');
  (*!-*)
  RESET(DEST,FILENAME);
  (*!+*)
  IF IORESULT = 0
  THEN BEGIN (2)
    WRITELN;
    WRITELN;
    WRITE('Destroy old ',FILENAME,'? Press ''N'' or ''Y'' ');
    IF GETCHAR(['y','n','y','n'],TRUE,TRUE,TRUE) IN ['y','y']
    THEN BEGIN (3)
      CLOSE(DEST,PURGE);
      REWRITE(DEST,FILENAME);
      NAMEOK := TRUE;
    END (3)
    ELSE BEGIN (4)
      CLOSE(DEST,LOCK);
      NAMEOK := FALSE;
    END; (4)
  END (2)
  ELSE BEGIN (5)
    (*!-*)
    REWRITE(DEST,FILENAME);
    (*!+*)
    ERRNUM := IORESULT;
    IF IORESULT <> 0
    THEN BEGIN (6)
      WRITELN;
      WRITELN;
      WRITELN('Cannot open ',FILENAME,' Io error #',ERRNUM);
      NAMEOK := FALSE;
    END (6)
    ELSE NAMEOK := TRUE;
  END; (5)
END; (* nameok *)

[.....]

BEGIN (* getnewfile *)
  REPEAT
    PAGE(OUTPUT);
    WRITE('Enter output file name, then press <RET> : ');
    READLN(FILENAME);
  UNTIL NAMEOK;
END;

[-----]

(* send control characters to screen *)
PROCEDURE SCRCONTROL; ( PASCAL interface to Screen Control)
VAR N: INTEGER; ( APPLE III Standard Device Drivers)
G_ARRAY:PACKED ARRAY[0.. 3] OF 0..255; (..... Pages 34 to 46.)
BEGIN
  G_ARRAY[0]:= I; G_ARRAY[1]:=J; G_ARRAY[2]:=K;
  UNITWRITE(1,G_ARRAY,3,,12);
END; (* scrcontrol *)

[-----]

(* switch to 40 column screen *)

```

```
PROCEDURE TEXT40MODE;
BEGIN
  SCRCONTROL(16,0,28);      (Text mode 40BW, followed by clearscreen.)
END; (* text40mode *)

{-----}

(* switch to 80 column screen *)
PROCEDURE TEXT80MODE;
BEGIN
  SCRCONTROL(04,0,0);      (Restore Viewport to its original condition.)
  SCRCONTROL(16,2,28);     (Text Mode 80, followed by clearscreen.)
END; (* text80mode *)

{-----}

(* turn on reverse video *)
(* black on white *)
PROCEDURE INVERSE;
BEGIN
  SCRCONTROL(18,0,0);
END; (* inverse *)

{-----}

(* switch back to normal screen *)
(* white on black *)
PROCEDURE NORMAL;
BEGIN
  SCRCONTROL(17,0,0);
END;
```

```

(-----*)
(*)
(*)      Textfile : EMGR.DIR/E.SUBRT.TEXT      Volume : TFILES      (*)
(*)      Codefile : E.MGR.CODE ('Include' file) Volume : CATDATA    (*)
(*)
(-----*)
(*)      DEC. 1, 1982      NPRDC      (*)
(-----*)

```

```

(*) initialize the examinee records *)
PROCEDURE INITEREC;
VAR I : INTEGER;
BEGIN

```

```

    (*) initialize test taking information *)
    WITH EXAMINEE DO
    BEGIN (1)
        ID := '      ';
        LASTTEST := GMAXSUBTEST; (* mark no tests taken yet *)
        NUMPROC := 0;
        TOTTIMECONSOLE := 0;
        NUMERRORS := 0;
        PREVTIMELASTTEST := 0;
        ORIENTATIONTIME := 0;
    END; (1)

```

```

    (*) initialize personal info *)
    WITH PINFO DO
    BEGIN (2)
        LASTNAME := '      ';
        FIRSTNAME := '      ';
        MINIMAL := '      ';
        CURRADDRESS := '      ';
        HOMEOFREC := '      ';
        CITIZENSHIP := '      ';
        SEX := '      ';
        POPGROUP := '      ';
        ETHNIC := '      ';
        MARITAL := '      ';
        DEPENDANTS := '      ';
        BIRTHDATE := '      ';
        EDUCATION := '      ';
        TESTID := '      ';
        AFQT := '      ';
        ASVAB := '      ';
        ENLISTDATE := '      ';
        ACTSERDATE := '      ';
        ENL := '      ';
        AFEE := '      ';
        BOS := '      ';
        POSTASVAB := '      ';
        STESTORDER := '      ';
    END; (2)

```

```

    (*) initialize the tests results record *)
    FOR I := 0 TO QUESTIONS DO
        TESTS.ITEMINFO(I).ITEMNUM := NIL;
    WITH TESTS DO
    BEGIN (3)
        STTIME := 0;
        STINSTRTIME := 0;
        STPROCTCALLS := 0;
        NUMITEMS := 0;
        NUMCORR := 0;
        ESTABILITY := 0;
    END; (3)
    END; (* initerec *)

```

```

(-----*)

(*) get directory index for an id number *)
FUNCTION DIRINDEXNUM;
VAR I : INTEGER;

```

```

    DONE : BOOLEAN;
BEGIN
    LOADINDEX;
    I := 0;
    DONE := FALSE;
    DIRINDEXNUM := NIL;
    REPEAT
        IF (DIR[I].ID = IDNUM)
            AND (NOT (DIR[I].UNUSED)) THEN
            BEGIN (I)
                DONE := TRUE;
                DIRINDEXNUM := I;
            END; (I)
            I := I + 1;
    UNTIL (I > MAXEXAMINEE) OR (DONE);
END;

{-----}

(* get examinee id number *)
PROCEDURE ENTERID;
VAR INSTRUCTIONS : STRING;
    OKID : BOOLEAN;
BEGIN
    OKID := FALSE;
    REPEAT
        PAGE (OUTPUT);
        FILLCHAR (LINEBUF (0), 9, ' ');
        GOTOXY (0, 10);
        INSTRUCTIONS := 'Enter Examinee Social Security number : ';
        (* read in 9 digit social security number *)
        WRITE (INSTRUCTIONS, '----- <return>');
        GOTOXY (LENGTH (INSTRUCTIONS), 10);
        FILLBUF (9, DIGITS, TRUE);
        MOVELEFT (LINEBUF (0), EXAMINEE.ID (0), 9);
        IF EXAMINEE.ID = ' ' THEN
            SQUAWK
        ELSE
            OKID := TRUE;
    UNTIL OKID;
    FILLCHAR (LINEBUF (0), 9, ' ');
END; (* enter id *)

```

```

(*)
(*)
(*)      Textfile : EMGR.DIR/E.IO.TEXT      Volume : TFILES      (*)
(*)      Codefile : E.MGR.CODE ('Include' file) Volume : CATDATA  (*)
(*)
(*)
(*)      DEC. 1, 1982      NPROC      (*)
(*)

```

(\* loads examinee personal data \*)

PROCEDURE LOADPDATA;

BEGIN

RESET(PINFOFILE,PINFONAME);

SEEK(PINFOFILE,RECORDNUM);

GET(PINFOFILE);

PINFO := PINFOFILE^;

CLOSE(PINFOFILE,LOCK);

END; (\* load personal data \*)

-----

(\* saves examinee personal data \*)

PROCEDURE SAVEPDATA;

BEGIN

RESET(PINFOFILE,PINFONAME);

SEEK(PINFOFILE,RECORDNUM);

PINFOFILE^ := PINFO;

PUT(PINFOFILE);

CLOSE(PINFOFILE,LOCK);

END; (\* load personal data \*)

-----

(\* loads examines directory \*)

PROCEDURE LOADINDEX;

BEGIN

RESET(FILEDIR,INDEXNAME);

SEEK(FILEDIR,0);

GET(FILEDIR);

DIR := FILEDIR^;

CLOSE(FILEDIR,LOCK);

END;

-----

(\* loads examinee personal data \*)

PROCEDURE LOADEXAMINEE;

BEGIN

RESET(FILEEXAMINEE,INFONAME);

SEEK(FILEEXAMINEE,RECNUM);

GET(FILEEXAMINEE);

EXAMINEE := FILEEXAMINEE^;

CLOSE(FILEEXAMINEE,LOCK);

END;

-----

(\* updates examinee personal data record \*)

PROCEDURE UPDATEEXAMINEE;

BEGIN

RESET(FILEEXAMINEE,INFONAME);

SEEK(FILEEXAMINEE,RECNUM);

FILEEXAMINEE^ := EXAMINEE;

PUT(FILEEXAMINEE);

CLOSE(FILEEXAMINEE,LOCK);

END;

-----

(\* updates examinee directory \*)

PROCEDURE UPDATEINDEX;

BEGIN

```
RESET(FILEDIR,INDEXNAME);  
SEEK(FILEDIR,0);  
FILEDIR^ := DIR;  
PUT(FILEDIR);  
CLOSE(FILEDIR,LOCK);  
END;
```

-----

```
(* loads examinee test scores *)  
PROCEDURE LOADRESULTS;  
BEGIN  
  RESET(FILETESTS,RESULTS);  
  SEEK(FILETESTS,RECNUM);  
  GET(FILETESTS);  
  TESTS := FILETESTS^;  
  CLOSE(FILETESTS,LOCK);  
END;
```

-----

```
(* updates examinee test scores *)  
PROCEDURE UPDATERESULTS;  
BEGIN  
  RESET(FILETESTS,RESULTS);  
  SEEK(FILETESTS,RECNUM);  
  FILETESTS^ := TESTS;  
  PUT(FILETESTS);  
  CLOSE(FILETESTS,LOCK);  
END;
```

```
(*****)
(*)
(*)      Textfile : EMGR.DIR/E.LOGIN.TEXT      Volume : TFILES      (*)
(*)      Codefile : E.MGR.CODE ('include' file) Volume : CATDATA      (*)
(*)
(*)*****)
(*)      DEC. 14, 1982      NPROC      (*)
(*)*****)
```

(\* log in the examinee, put them into the system \*)  
 PROCEDURE LOGINEXAMINEE;

```
VAR ERECNUM : INTEGER;
    EID : IDTYPE;
    DONE : BOOLEAN;
    CHOICE : CHAR;
```

```
(* locate unused slot in directory *)
(* returns nil if no space left. *)
FUNCTION OPENSLOT : INTEGER;
VAR I : INTEGER;
    DONE : BOOLEAN;
BEGIN
  I := 0;
  REPEAT
    IF DIR[I].UNUSED
      THEN DONE := TRUE
      ELSE I := I + 1;
  UNTIL (I > MAXEXAMINEE) OR (DONE);
  IF DONE
    THEN OPENSLOT := I
    ELSE OPENSLOT := NIL;
END;
```

{-----}

```
(* get directory index for an id number *)
(* returns nil if no such id exists. *)
FUNCTION DIRINDEXNUM(IDNUM : IDTYPE) : INTEGER;
VAR I : INTEGER;
    DONE : BOOLEAN;
BEGIN
  LOADINDEX;
  I := 0;
  DONE := FALSE;
  DIRINDEXNUM := NIL;
  REPEAT
    IF (DIR[I].ID = IDNUM) AND
       (NOT (DIR[I].UNUSED)) THEN
      BEGIN (I)
        DONE := TRUE;
        DIRINDEXNUM := I;
      END; (I)
    I := I + 1;
  UNTIL (I > MAXEXAMINEE) OR (DONE);
END; (* dirindexnum *)
```

{.....}

```
BEGIN (* log in *)
  (* initialize line buffer *)
  FILLCHAR(LINEBUF[0],79,' ');

  DONE := FALSE;
  REPEAT
    ENTERID; (* get id number *)
    EID := EXAMINEE.ID;
    ERECNUM := DIRINDEXNUM(EXAMINEE.ID);
    IF ERECNUM >= 0 THEN (* examinee exists in directory already *)
      BEGIN (I)
        LOADEXAMINEE(ERECNUM);
        WRITELN;
```

```

WRITELN;
WRITELN('Examinee ',EXAMINEE.ID,' previously logged in.');
```

WRITELN;

```

IF EXAMINEE.LASTTEST > GMAXSUBTEST THEN
  WRITELN('This examinee has completed all testing.');
```

WRITELN;

```

STALL;
END (1)
ELSE
  BEGIN (2)
    (* find open directory/set record # to store examinee *)
    ERECNUM := OPENSLOT;
    IF ERECNUM < 0 THEN
      BEGIN (3)
        PAGE(OUTPUT);
        GOTOXY(0,10);
        WRITELN('No room in directory put examinee!');
```

WRITELN;

```

        WRITELN;
        STALL;
        EXIT(LOGINEXAMINEE);
      END (3)
    ELSE
      BEGIN (4)
        LOADEXAMINEE(ERECNUM);
        DIR(ERECNUM).UNUSED := FALSE;
        DIR(ERECNUM).ID := EID;
        EXAMINEE.NUMPROC := 0;
        EXAMINEE.ID := EID;
        EXAMINEE.LASTTEST := GMAXSUBTEST; (* flag new examinee *)

        (* update examinee record on disk *)
        UPDATEEXAMINEE(ERECNUM);

        (* update examinee directory *)
        UPDATEINDEX;

        WRITELN;
        WRITELN;
        WRITELN('Examinee ',EXAMINEE.ID,' entered into system.');
```

WRITELN;

```

        WRITELN;
        WRITELN('Press <RET> to continue logging in examinees or');
        WRITE('press <ESC> to quit. ');
        CHOICE := GETCHAR((CHR(RET),CHR(ESC)),TRUE,FALSE,TRUE);
        IF CHOICE = CHR(ESC) THEN
          DONE := TRUE;
        END; (4)
      END; (2)
    UNTIL DONE;
  END; (* log-in *)

```

```
(*-----*)
(*)
(*)      Textfile : EMGR.DIR/E.FETCH.TEXT      Volume : TFILES      (*)
(*)      Codefile : E.MGR.CODE ('Include' file) Volume : CATDATA    (*)
(*)-----*)
(*) File Last Modified : Oct 1, 1983          NPRDC          (*)
(*)-----*)
```

(\* enter / modify examinee data \*)

```
PROCEDURE ENTERDATA;
VAR IDINDEX : INTEGER;
    COMMAND : CHAR;
    OK1,OK2,OK3,OK4,
    CHANGED,
    FOREVER : BOOLEAN;
```

{-----}

(\* display examinee personal data \*)

```
PROCEDURE DISPLAYEXAMINEE;
VAR J : INTEGER;
```

{.....}

(\* display some data \*)

```
PROCEDURE D1;
BEGIN
    WITH PINFO DO
        BEGIN {1}
            GOTOXY(0,4);
            WRITE(' Last Name');
            WRITE(' : ',LASTNAME);
            GOTOXY(32,4);
            WRITE('First Name');
            WRITE(' : ',FIRSTNAME);
            GOTOXY(60,4);
            WRITE('Middle Initial');
            WRITE(' : ',MINITIAL);
            GOTOXY(1,5);
            WRITE('Current Address (State)');
            WRITE(' : ',CURRADDRESS);
            GOTOXY(40,5);
            WRITE('Home of Record (State)');
            WRITELN(' : ',HOMEOFRECORD);
            WRITE(' Citizenship');
            WRITELN(' : ',CITIZENSHIP);
            WRITE(' Sex');
            WRITELN(' : ',SEX);
            WRITE(' Population Group');
            WRITELN(' : ',POPGROUP);
            WRITE(' Ethnic Group');
            WRITELN(' : ',ETHNIC);
            WRITE(' Marital Status');
            WRITELN(' : ',MARITAL);
            WRITE(' Number of Dependents');
            WRITELN(' : ',DEPENDANTS);
            WRITE(' Date of Birth');
            WRITELN(' : ',BIRTHDATE);
        END; {1}
    END; (* d1 *)
```

{.....}

BEGIN (\* display examinee \*)

PAGE(OUTPUT);

D1;

WITH PINFO DO

BEGIN {1}

```
    WRITE(' Education');
    WRITELN(' : ',EDUCATION);
    WRITE(' Test Id');
    WRITELN(' : ',TESTID);
```

```

WRITE(' AFQT');
WRITELN(' : ',AFQT);
WRITE(' ASVAB Scores');
WRITELN(' : ',ASVAB);
WRITE(' Date of Enlistment');
WRITELN(' : ',ENLISTDATE);
WRITE(' Active Service Date');
WRITELN(' : ',ACTSERDATE);
WRITE(' Rating / MOS');
WRITELN(' : ',ENL);
WRITE(' AFES');
WRITELN(' : ',AFES);
WRITE(' Branch of Service');
WRITELN(' : ',BOS);
WRITE(' Retest ASVAB');
WRITELN(' : ',POSTASVAB);
WRITE(' Test Order');
WRITE(' : ',STESTORDER[0],STESTORDER[1]);
END; (1)
END; (* display examinee *)

```

```

(*-----*)

```

```

(* get examinee personal data *)
PROCEDURE GETDATA;

```

```

(.....)

```

```

(* read in a string and save in a temporary buffer *)
PROCEDURE EFILLBUF(CHARCNT : INTEGER;
                   OKSET : SETOFCHAR; ERASE : BOOLEAN);

```

```

VAR I : INTEGER;
    IOCHAR : CHAR;
BEGIN
    CHANGED := FALSE;
    I := 0;
    REPEAT
        IF I > (CHARCNT-1) THEN
            IOCHAR :=
                GETCHAR([CHR(LARROW),CHR(RET)],TRUE,TRUE,TRUE)
        ELSE
            BEGIN (1)
                IF I = 0 THEN
                    IOCHAR :=
                        GETCHAR(OKSET + [CHR(RET),
                                      CHR(ESC),CHR(LARROW),CHR(RARROW)],
                              TRUE,TRUE,TRUE)
                ELSE
                    IOCHAR :=
                        GETCHAR(OKSET + [CHR(RET),
                                      CHR(LARROW),CHR(RARROW)],
                              TRUE,TRUE,TRUE);
            END
        IF IOCHAR = CHR(ESC) THEN
            BEGIN (2)
                OVER := FALSE;
                EXIT(GETDATA);
            END; (2)
        IF IOCHAR IN OKSET THEN
            BEGIN (3)
                CHANGED := TRUE;
                LINEBUF[I] := IOCHAR;
                I := I + 1;
            END; (3)
        END; (1)
        IF IOCHAR = CHR(LARROW) THEN
            BEGIN (4)
                IF I = 0 THEN

```

```

        SQUAWK
      ELSE
        BEGIN (5)
          WRITE (CHR (LARROW));
          I := I - 1;
          IF ERASE THEN
            BEGIN (6)
              WRITE (' ');
              WRITE (CHR (LARROW));
              LINEBUF [I] := ' ';
            END; (6)
          END; (5)
        END (4)
      ELSE
        IF IDCHAR = CHR (RARROW) THEN
          BEGIN (7)
            WRITE (LINEBUF [I]);
            I := I + 1;
          END; (7)
        UNTIL IDCHAR = CHR (RET);
      END; (* Efillbuf *)

    {-----}

    (* get personal data part 1 *)
    PROCEDURE GET1DATA;
    BEGIN
      INVERSE;
      GOTOXY (1,4);
      WRITE ('Last Name');
      NORMAL;
      GOTOXY (13,4);
      MOVELEFT (PINFO.LASTNAME [0], LINEBUF [0], 15);
      EFILLBUF (15, LETTERS + [' '], TRUE);
      IF CHANGED THEN
        OK1 := FALSE;
      MOVELEFT (LINEBUF [0], PINFO.LASTNAME [0], 15);
      FILLCHAR (LINEBUF [0], 15, ' ');
      GOTOXY (1,4);
      WRITE ('Last Name');

      INVERSE;
      GOTOXY (32,4);
      WRITE ('First Name');
      NORMAL;
      GOTOXY (45,4);
      MOVELEFT (PINFO.FIRSTNAME [0], LINEBUF [0], 12);
      EFILLBUF (12, LETTERS + [' '], TRUE);
      MOVELEFT (LINEBUF [0], PINFO.FIRSTNAME [0], 12);
      FILLCHAR (LINEBUF [0], 12, ' ');
      GOTOXY (32,4);
      WRITE ('First Name');

      INVERSE;
      GOTOXY (60,4);
      WRITE ('Middle Initial');
      NORMAL;
      GOTOXY (77,4);
      LINEBUF [0] := PINFO.MINIMAL;
      EFILLBUF (1, LETTERS + [' '], TRUE);
      PINFO.MINIMAL := LINEBUF [0];
      LINEBUF [0] := ' ';
      GOTOXY (60,4);
      WRITE ('Middle Initial');

      INVERSE;
      GOTOXY (1,5);
      WRITE ('Current Address (State)');
      NORMAL;
      GOTOXY (27,5);
      MOVELEFT (PINFO.CURRADDRESS [0], LINEBUF [0], 2);
      EFILLBUF (2, LETTERS + [' '], TRUE);
      MOVELEFT (LINEBUF [0], PINFO.CURRADDRESS [0], 2);
    
```

```

FILLCHAR(LINEBUF[0],2,' ');
GOTOXY(1,5);
WRITE('Current Address (State)');

INVERSE;
GOTOXY(40,5);
WRITE('Home of Record (State)');
NORMAL;
GOTOXY(65,5);
MOVELEFT(PINFO.HOMEFREC[0],LINEBUF[0],2);
EFILLBUF(2,LETTERS + [' '],TRUE);
MOVELEFT(LINEBUF[0],PINFO.HOMEFREC[0],2);
FILLCHAR(LINEBUF[0],2,' ');
GOTOXY(40,5);
WRITE('Home of Record (State)');
END; (* get1data *)

```

{-----}

```

(* get more personal data *)
PROCEDURE GET2DATA;
BEGIN
  INVERSE;
  GOTOXY(1,6);
  WRITE('Citizenship');
  NORMAL;
  GOTOXY(15,6);
  MOVELEFT(PINFO.CITIZENSHIP[0],LINEBUF[0],4);
  EFILLBUF(4,LETTERS + [' '],TRUE);
  MOVELEFT(LINEBUF[0],PINFO.CITIZENSHIP[0],4);
  FILLCHAR(LINEBUF[0],4,' ');
  GOTOXY(1,6);
  WRITE('Citizenship');

  INVERSE;
  GOTOXY(1,7);
  WRITE('Sex');
  NORMAL;
  GOTOXY(7,7);
  LINEBUF[0] := PINFO.SEX;
  EFILLBUF(1,LETTERS + [' '],TRUE);
  PINFO.SEX := LINEBUF[0];
  LINEBUF[0] := ' ';
  GOTOXY(1,7);
  WRITE('Sex');

  INVERSE;
  GOTOXY(1,8);
  WRITE('Population Group');
  NORMAL;
  GOTOXY(20,8);
  MOVELEFT(PINFO.POPGROUP[0],LINEBUF[0],1);
  EFILLBUF(1,DIGITS + [' '] + LETTERS,TRUE);
  MOVELEFT(LINEBUF[0],PINFO.POPGROUP[0],1);
  FILLCHAR(LINEBUF[0],1,' ');
  GOTOXY(1,8);
  WRITE('Population Group');

  INVERSE;
  GOTOXY(1,9);
  WRITE('Ethnic Group');
  NORMAL;
  GOTOXY(16,9);
  MOVELEFT(PINFO.ETHNIC[0],LINEBUF[0],1);
  EFILLBUF(1,LETTERS + DIGITS + [' '],TRUE);
  MOVELEFT(LINEBUF[0],PINFO.ETHNIC[0],1);
  FILLCHAR(LINEBUF[0],1,' ');
  GOTOXY(1,9);
  WRITE('Ethnic Group');

  INVERSE;
  GOTOXY(1,10);

```

```

WRITE('Marital Status');
NORMAL;
GOTOXY(18,10);
LINEBUF[0] := PINFO.MARITAL;
EFILLBUF(1,LETTERS + [' '],TRUE);
PINFO.MARITAL := LINEBUF[0];
LINEBUF[0] := ' ';
GOTOXY(1,10);
WRITE('Marital Status');
END; (* get2data *)

```

```

{-----}

```

```

(* get personal data part 3 *)
PROCEDURE GET3DATA;
BEGIN
  INVERSE;
  GOTOXY(1,11);
  WRITE('Number of Dependents');
  NORMAL;
  GOTOXY(24,11);
  MOVELEFT(PINFO.DEPENDANTS[0],LINEBUF[0],2);
  EFILLBUF(2,DIGITS + [' '],TRUE);
  MOVELEFT(LINEBUF[0],PINFO.DEPENDANTS[0],2);
  FILLCHAR(LINEBUF[0],2,' ');
  GOTOXY(1,11);
  WRITE('Number of Dependents');

  INVERSE;
  GOTOXY(1,12);
  WRITE('Date of Birth');
  NORMAL;
  GOTOXY(17,12);
  MOVELEFT(PINFO.BIRTHDATE[0],LINEBUF[0],8);
  EFILLBUF(8,DIGITS + ['/',' '],TRUE);
  MOVELEFT(LINEBUF[0],PINFO.BIRTHDATE[0],8);
  FILLCHAR(LINEBUF[0],8,' ');
  GOTOXY(1,12);
  WRITE('Date of Birth');

  INVERSE;
  GOTOXY(1,13);
  WRITE('Education');
  NORMAL;
  GOTOXY(13,13);
  MOVELEFT(PINFO.EDUCATION[0],LINEBUF[0],3);
  EFILLBUF(3,LETTERS + DIGITS + [' '],TRUE);
  MOVELEFT(LINEBUF[0],PINFO.EDUCATION[0],3);
  FILLCHAR(LINEBUF[0],3,' ');
  GOTOXY(1,13);
  WRITE('Education');

  INVERSE;
  GOTOXY(1,14);
  WRITE('Test Id');
  NORMAL;
  GOTOXY(11,14);
  MOVELEFT(PINFO.TESTID[0],LINEBUF[0],3);
  EFILLBUF(3,DIGITS + LETTERS + [' '],TRUE);
  MOVELEFT(LINEBUF[0],PINFO.TESTID[0],3);
  FILLCHAR(LINEBUF[0],3,' ');
  GOTOXY(1,14);
  WRITE('Test Id');

  INVERSE;
  GOTOXY(1,15);
  WRITE('AFQT');
  NORMAL;
  GOTOXY(8,15);
  MOVELEFT(PINFO.AFQT[0],LINEBUF[0],2);
  EFILLBUF(4,DIGITS + [' '],TRUE);
  MOVELEFT(LINEBUF[0],PINFO.AFQT[0],2);
  FILLCHAR(LINEBUF[0],2,' ');

```

```

GOTOXY(1,15);
WRITE('AFQT');
END; (* get3data *)

```

```

-----

```

```

(* get more personal data part 4 *)

```

```

PROCEDURE GET4DATA;

```

```

BEGIN

```

```

  INVERSE;

```

```

  GOTOXY(1,16);

```

```

  WRITE('ASVAB Scores');

```

```

  NORMAL;

```

```

  GOTOXY(16,16);

```

```

  MOVELEFT(PINFO.ASVAB[0],LINEBUF[0],32);

```

```

  EFILLBUF(32,DIGITS + [' '],TRUE);

```

```

  IF CHANGED THEN

```

```

    OK2 := FALSE;

```

```

  MOVELEFT(LINEBUF[0],PINFO.ASVAB[0],32);

```

```

  FILLCHAR(LINEBUF[0],32,' ');

```

```

  GOTOXY(1,16);

```

```

  WRITE('ASVAB Scores');

```

```

  INVERSE;

```

```

  GOTOXY(1,17);

```

```

  WRITE('Date of Enlistment');

```

```

  NORMAL;

```

```

  GOTOXY(22,17);

```

```

  MOVELEFT(PINFO.ENLISTDATE[0],LINEBUF[0],8);

```

```

  EFILLBUF(8,DIGITS + [' / ',' '],TRUE);

```

```

  MOVELEFT(LINEBUF[0],PINFO.ENLISTDATE[0],8);

```

```

  FILLCHAR(LINEBUF[0],8,' ');

```

```

  GOTOXY(1,17);

```

```

  WRITE('Date of Enlistment');

```

```

  INVERSE;

```

```

  GOTOXY(1,18);

```

```

  WRITE('Active Service Date');

```

```

  NORMAL;

```

```

  GOTOXY(23,18);

```

```

  MOVELEFT(PINFO.ACTSERDATE[0],LINEBUF[0],8);

```

```

  EFILLBUF(8,DIGITS + [' / ',' '],TRUE);

```

```

  MOVELEFT(LINEBUF[0],PINFO.ACTSERDATE[0],8);

```

```

  FILLCHAR(LINEBUF[0],8,' ');

```

```

  GOTOXY(1,18);

```

```

  WRITE('Active Service Date');

```

```

  INVERSE;

```

```

  GOTOXY(1,19);

```

```

  WRITE('Rating / MOS');

```

```

  NORMAL;

```

```

  GOTOXY(16,19);

```

```

  MOVELEFT(PINFO.ENL[0],LINEBUF[0],5);

```

```

  EFILLBUF(5,DIGITS + LETTERS + [' '],TRUE);

```

```

  IF CHANGED THEN

```

```

    OK3 := FALSE;

```

```

  MOVELEFT(LINEBUF[0],PINFO.ENL[0],5);

```

```

  FILLCHAR(LINEBUF[0],5,' ');

```

```

  GOTOXY(1,19);

```

```

  WRITE('Rating / MOS');

```

```

  INVERSE;

```

```

  GOTOXY(1,20);

```

```

  WRITE('AFEES');

```

```

  NORMAL;

```

```

  GOTOXY(9,20);

```

```

  MOVELEFT(PINFO.AFEES[0],LINEBUF[0],2);

```

```

  EFILLBUF(2,LETTERS + DIGITS + [' '],TRUE);

```

```

  MOVELEFT(LINEBUF[0],PINFO.AFEES[0],2);

```

```

  FILLCHAR(LINEBUF[0],2,' ');

```

```

  GOTOXY(1,20);

```

```

  WRITE('AFEES');

```

```
END;      (* get4data *)
```

```
(* ----- *)
```

```
(* get some more data *)
```

```
PROCEDURE GET5DATA;
```

```
BEGIN
```

```
  INVERSE;
```

```
  GOTOXY(1,21);
```

```
  WRITE('Branch of Service');
```

```
  NORMAL;
```

```
  GOTOXY(21,21);
```

```
  MOVELEFT(PINFO.BOS(0),LINEBUF(0),2);
```

```
  EFILLBUF(2,LETTERS + [' '],TRUE);
```

```
  MOVELEFT(LINEBUF(0),PINFO.BOS(0),2);
```

```
  FILLCHAR(LINEBUF(0),2,' ');
```

```
  GOTOXY(1,21);
```

```
  WRITE('Branch of Service');
```

```
  INVERSE;
```

```
  GOTOXY(1,22);
```

```
  WRITE('Retest ASYAB');
```

```
  NORMAL;
```

```
  GOTOXY(16,22);
```

```
  MOVELEFT(PINFO.POSTASYAB(0),LINEBUF(0),32);
```

```
  EFILLBUF(32,DIGITS + [' '],TRUE);
```

```
  IF CHANGED THEN
```

```
    OK4 := FALSE;
```

```
  MOVELEFT(LINEBUF(0),PINFO.POSTASYAB(0),32);
```

```
  FILLCHAR(LINEBUF(0),32,' ');
```

```
  GOTOXY(1,22);
```

```
  WRITE('Retest ASYAB');
```

```
  INVERSE;
```

```
  GOTOXY(1,23);
```

```
  WRITE('Test Order');
```

```
  NORMAL;
```

```
  GOTOXY(14,23);
```

```
  MOVELEFT(PINFO.stestorder(0),LINEBUF(0),2);
```

```
  EFILLBUF(2,LETTERS + [' '],TRUE);
```

```
  MOVELEFT(LINEBUF(0),PINFO.STESTORDER(0),2);
```

```
  FILLCHAR(LINEBUF(0),2,' ');
```

```
  GOTOXY(1,23);
```

```
  WRITE('Test Order');
```

```
END;      (* get5data *)
```

```
(* ----- *)
```

```
BEGIN (* getdata *)
```

```
  GOTOXY(0,0);
```

```
  WRITELN(
```

```
    'DATA ENTRY INSTRUCTIONS : To enter/modify data, type in the data you want');
```

```
  WRITELN(
```

```
    'and then press <RET> to accept that data. To skip the current field, just');
```

```
  WRITELN(
```

```
    'press <RET>. To quit, press <RET> and then <ESC>.'));
```

```
  FOREVER := TRUE;
```

```
  REPEAT
```

```
    GET1DATA;
```

```
    GET2DATA;
```

```
    GET3DATA;
```

```
    GET4DATA;
```

```
    GET5DATA;
```

```
  UNTIL NOT FOREVER;
```

```
END;      (* getdata *)
```

```
(* ----- *)
```

```
(* verify certain data *)
PROCEDURE VERIFYDATA;
VAR VLASTNAME : PACKED ARRAY[0..14] OF CHAR;
    VASVAB,VRETEST : PACKED ARRAY[0..43] OF CHAR;
    VENL : PACKED ARRAY[0..4] OF CHAR;

DONE : BOOLEAN;

(* get verified data *)
PROCEDURE GETVDATA;
BEGIN
    FILLCHAR(LINEBUF[0],80,' ');

    GOTOXY(1,4);
    WRITE('Last Name : ');
    IF OK1 THEN WRITE(PINFO.LASTNAME,' (Data OK)');
    GOTOXY(1,5);
    WRITE('ASVAB Scores : ');
    IF OK2 THEN WRITE(PINFO.ASVAB,' (Data OK)');
    GOTOXY(1,6);
    WRITE('Rating / MOS : ');
    IF OK3 THEN WRITE(PINFO.ENL,' (Data OK)');
    GOTOXY(1,7);
    WRITE('Retest ASVAB Scores : ');
    IF OK4 THEN WRITE(PINFO.POSTASVAB,' (Data OK)');

    IF NOT OK1 THEN
    BEGIN
        INVERSE;
        GOTOXY(1,4);
        WRITE('Last Name');
        NORMAL;
        WRITE(' : ');
        GOTOXY(13,4);
        FILLBUF(15,LETTERS + [' '],TRUE);
        MOVELEFT(LINEBUF[0],VLASTNAME[0],15);
        FILLCHAR(LINEBUF[0],15,' ');
        GOTOXY(1,4);
        WRITE('Last Name');
    END;

    IF NOT OK2 THEN
    BEGIN
        INVERSE;
        GOTOXY(1,5);
        WRITE('ASVAB Scores');
        NORMAL;
        WRITE(' : ');
        GOTOXY(16,5);
        FILLBUF(32,DIGITS + [' '],TRUE);
        MOVELEFT(LINEBUF[0],VASVAB[0],32);
        FILLCHAR(LINEBUF[0],32,' ');
        GOTOXY(1,5);
        WRITE('ASVAB Scores');
    END;

    IF NOT OK3 THEN
    BEGIN
        INVERSE;
        GOTOXY(1,6);
        WRITE('Rating / MOS');
        NORMAL;
        WRITE(' : ');
        GOTOXY(16,6);
        FILLBUF(5,DIGITS + LETTERS + [' '],TRUE);
        MOVELEFT(LINEBUF[0],VENL[0],5);
        FILLCHAR(LINEBUF[0],5,' ');
        GOTOXY(1,6);
        WRITE('Rating / MOS');
    END;
```

```

IF NOT OK4 THEN
BEGIN
  INVERSE;
  GOTOXY(1,7);
  WRITE('Retest ASVAB Scores');
  NORMAL;
  WRITE(' : ');
  GOTOXY(23,7);
  FILLBUF(32,DIGITS + [' '],TRUE);
  MOVELEFT(LINEBUF[0],VRETEST[0],32);
  FILLCHAR(LINEBUF[0],32,' ');
  GOTOXY(1,7);
  WRITE('Retest ASVAB Scores');
END;

```

```
END; (* getvdata *)
```

```
(*-----*)
```

```

PROCEDURE CHECKDAT;
BEGIN
  PAGE(OUTPUT);
  GOTOXY(0,4);
  IF (PINFO.LASTNAME <> VLASTNAME) THEN
    WRITELN('*** ERROR ***')
  ELSE
    OK1 := TRUE;
    WRITELN('Previous Last Name : ',PINFO.LASTNAME);
    WRITELN('Verified Last Name : ',VLASTNAME);
    WRITELN;
    IF (PINFO.ASVAB <> VASVAB) THEN
      WRITELN('*** ERROR ***')
    ELSE
      OK2 := TRUE;
      WRITELN('Previous ASVAB Scores : ',PINFO.ASVAB);
      WRITELN('Verified ASVAB Scores : ',VASVAB);
      WRITELN;
      IF (PINFO.ENL <> VENL) THEN
        WRITELN('*** ERROR ***')
      ELSE
        OK3 := TRUE;
        WRITELN('Previous Rating / MOS : ',PINFO.ENL);
        WRITELN('Verified Rating / MOS : ',VENL);
        WRITELN;
        IF (PINFO.POSTASVAB <> VRETEST) THEN
          WRITELN('*** ERROR ***')
        ELSE
          OK4 := TRUE;
          WRITELN('Previous Retest ASVAB Scores : ',PINFO.POSTASVAB);
          WRITELN('Verified Retest ASVAB Scores : ',VRETEST);
          WRITELN;
          WRITELN;
END; (* checkdat *)

```

```

BEGIN (* verifydata *)
  IF OK1 THEN
    VLASTNAME := PINFO.LASTNAME
  ELSE
    FILLCHAR(VLASTNAME[0],15,' ');
  IF OK2 THEN
    VASVAB := PINFO.ASVAB
  ELSE
    FILLCHAR(VASVAB[0],44,' ');
  IF OK3 THEN
    VENL := PINFO.ENL
  ELSE
    FILLCHAR(VENL[0],5,' ');
  IF OK4 THEN
    VRETEST := PINFO.POSTASVAB

```

```

ELSE
  FILLCHAR(VRETEST[0],44,' ');
DONE := FALSE;
REPEAT
  PAGE(OUTPUT);
  WRITELN(
    'To verify certain pieces of data, please enter the information below for the');
  WRITELN(
    'examinee again.');
```

```

  GETVDATA;
  CHECKDAT;

  IF (PINFO.ENL <> VENL) OR
     (PINFO.ASVAB <> VASVAB) OR
     (PINFO.LASTNAME <> VLASTNAME) OR
     (PINFO.POSTASVAB <> VRETEST) THEN
    BEGIN
      SQUAWK;
      WRITE('Do you want to re-enter the data? Y/N : ');
      IF GETCHAR(['Y','N','y','n'],TRUE,TRUE,TRUE) IN ['Y','y'] THEN
        BEGIN
          DISPLAYEXAMINEE;
          GETDATA;
        END
      ELSE
        BEGIN
          DONE := TRUE;
          IF NOT OK1 THEN FILLCHAR(PINFO.LASTNAME[0],15,' ');
          IF NOT OK2 THEN FILLCHAR(PINFO.ASVAB[0],44,' ');
          IF NOT OK3 THEN FILLCHAR(PINFO.ENL[0],5,' ');
          IF NOT OK4 THEN FILLCHAR(PINFO.POSTASVAB[0],44,' ');
        END;
      END
    ELSE
      BEGIN
        DONE := TRUE;
        WRITE('Verified data is OK.');
```

```

        WRITELN;
        WRITELN;
        STALL;
      END;
    UNTIL DONE;
  END; (* verifydata *)

  (.....)

BEGIN (* enter data *)
  LOADINDEX;
  ENTERID;
  IDINDEX := DIRINDEXNUM(EXAMINEE.ID);
  IF IDINDEX < 0 THEN
    BEGIN (1)
      GOTOXY(8,12);
      WRITELN('No record in file with ID : ',EXAMINEE.ID);
      WRITELN;
      STALL;
    END (1)
  ELSE
    BEGIN (2)
      LOADPDATA(IDINDEX);
      DISPLAYEXAMINEE;
      OK1 := TRUE;
      OK2 := TRUE;
      OK3 := TRUE;
      OK4 := TRUE;
      GETDATA;
      VERIFYDATA;
      SAVEPDATA(IDINDEX);
    END; (2)
  END; (* enter data *)

```

```
(*****
(*)
(*)   Textfile : EMGR.DIR/E.STATUS.TEXT       Volume : TFILES       (*)
(*)   Codefile : E.MGR.CODE ('Include' file) Volume : CATDATA      (*)
(*)
(*)*****
(*)   DEC.  1, 1982                          NPRDC                  (*)
(*)*****
```

(\* list the status of all examinees in directory \*)

```
PROCEDURE ESTATUS;
VAR COUNT,
    STATUSCODE,
    I,K : INTEGER;
    IDCHAR : CHAR;

BEGIN
    PAGE(OUTPUT);
    WRITELN;
    WRITELN(' Examinee Id #                Status');
    WRITELN('-----');
    WRITELN;
    LOADINDEX;
    COUNT := 0;
    FOR K := 0 TO 9 DO
        BEGIN (1)
            IDCHAR := CHR(K+48);
            FOR I := 0 TO MAXEXAMINEE DO
                BEGIN (2)
                    IF NOT (DIR[I].UNUSED) THEN
                        BEGIN (3)
                            IF DIR[I].ID[0] = IDCHAR THEN
                                BEGIN (4)
                                    COUNT := COUNT + 1;
                                    WRITE(DIR[I].ID);
                                    WRITE(' ');
                                    LOADEXAMINEE(I);
                                    STATUSCODE := EXAMINEE.LASTTEST;
                                    IF STATUSCODE < GMAXSUBTEST THEN
                                        WRITELN('Session not completed, ',EXAMINEE.LASTTEST,
                                            ' tests finished. ');
                                    IF STATUSCODE = GMAXSUBTEST THEN
                                        WRITELN('New examinee ');
                                    IF STATUSCODE > GMAXSUBTEST THEN
                                        WRITELN('Examinee has completed session. ');
                                END; (4)
                            END; (3)
                        END; (2)
                    WRITELN;
                END; (1)
            WRITELN;
            WRITELN('-----');
            WRITELN;
            WRITELN(COUNT,' examinees in directory. ');
            WRITELN;
            STALL;
        END; (* estatus *)
```

```

(*****)
(*)
(*)      Textfile : EMGR.DIR/E.DELETE.TEXT      Volume : TFILES      (*)
(*)      Codefile : E.MGR.CODE ('Include' file) Volume : CATDATA      (*)
(*)
(*****)
(*)      DEC. 1, 1982      NPRDC      (*)
(*****)

```

```

(* remove examinee record from file *)
PROCEDURE REMOVEEXAMINEE(IDNUM : INTEGER);
VAR TESTSLOT,
    J : INTEGER;
BEGIN

```

```

    (* initialize the examinee records *)
    INITEREC;

```

```

    (* zero out test taking info *)
    UPDATEEXAMINEE(IDNUM);

```

```

    (* zero out personal data *)
    SAVEPDATA(IDNUM);

```

```

    (* zero out testing results *)
    TESTSLOT := IDNUM * STESTS;
    RESET(FILETESTS, RESULTS);
    J := 0;
    REPEAT
        SEEK(FILETESTS, TESTSLOT);
        FILETESTS^ := TESTS;
        PUT(FILETESTS);
        TESTSLOT := TESTSLOT + 1;
        J := J + 1;
    UNTIL J = STESTS;
    CLOSE(FILETESTS, LOCK);

```

```

    (* update directory with examinees removed *)
    DIR(IDNUM).UNUSED := TRUE;
    UPDATEINDEX;
END; (* remove examinee *)

```

```

-----

```

```

(**** get record in a file to delete ****)
PROCEDURE DELEETEEXAMINEE;
VAR IDINDEX : INTEGER;
BEGIN (* delete *)
    LOADINDEX;
    ENTERID;
    IDINDEX := DIRINDEXNUM(EXAMINEE.ID);
    IF IDINDEX < 0 THEN
        BEGIN (1)
            GOTOXY(1,12);
            WRITELN('No record in file with ID : ', EXAMINEE.ID);
            WRITELN;
            STALL;
        END (1)
    ELSE
        BEGIN (2)
            WRITELN;
            WRITELN;
            WRITE('Delete examinee ', EXAMINEE.ID, ' ? (Press ''N'' or ''Y'') : ');
            IF GETCHAR(['Y', 'n', 'Y', 'N'], TRUE, TRUE, TRUE) IN ['Y', 'y'] THEN
                REMOVEEXAMINEE(IDINDEX);
        END; (2)
    END; (* delete examinee *)

```

```
(*****)
(*)
(*)   Textfile : EMGR.DIR/E.ENDOFDAY.TEXT   Volume : TFILES   (*)
(*)   Codefile : E.MGR.CODE ('Include' file) Volume : CATDATA (*)
(*)
(*)*****)
(*)           DEC. 1, 1982                   NPRDC              (*)
(*)*****)
```

(\* back up all examinees who have finished session \*)

PROCEDURE ENDOFDAY;

```
VAR COUNT,
    STATUSCODE,
    I,J,K : INTEGER;

    DEXAMINEE : FILE OF EXAMINFO;
    DFDIR : FILE OF INDEX;
    DTESTS : FILE OF SUBTEST;
    DPINFO : FILE OF PINFOREC;
```

```
BEGIN (* end of day *)
    PAGE(OUTPUT);
    WRITELN;
    WRITE('Erase old contents of backup file ? (Press ''Y'' or ''N'') : ');
    IF GETCHAR(['Y','Y','n','N'],TRUE,TRUE,TRUE) IN ['N','n'] THEN
        EXIT(ENDOFDAY);
```

```
FOR I := 0 TO MAXEXAMINEE DO
    DIR[I].UNUSED := TRUE;
    RESET(FILEDIR,DONEINDEX);
    SEEK(FILEDIR,0);
    FILEDIR^ := DIR;
    PUT(FILEDIR);
    CLOSE(FILEDIR,LOCK);
```

```
WRITELN;
WRITELN;
WRITELN('Backing up examinees who have finished session');
WRITELN;
LOADINDEX;
COUNT := 0;
FOR I := 0 TO MAXEXAMINEE DO
    BEGIN (1)
        IF NOT (DIR[I].UNUSED) THEN
            BEGIN (2)
                LOADEXAMINEE(I);
                LOADPDATA(I);
                STATUSCODE := EXAMINEE.LASTTEST;
                IF STATUSCODE > GMAXSUBTEST THEN
                    BEGIN (3)
```

```
                    WRITELN;
                    WRITE('Backing up ',EXAMINEE.ID);
```

```
                    (* update the done directory *)
                    WRITE('.');
```

```
                RESET(DFDIR,DONEINDEX);
                SEEK(DFDIR,0);
                DFDIR^[COUNT].UNUSED := FALSE;
                DFDIR^[COUNT].ID := DIR[I].ID;
                PUT(DFDIR);
                CLOSE(DFDIR,LOCK);
```

```
                (* update the done test taking info *)
```

```
                WRITE('.');
                RESET(DEXAMINEE,DONEINFO);
                SEEK(DEXAMINEE,COUNT);
```

```

DEXAMINEE^ := EXAMINEE;
PUT (DEXAMINEE);
CLOSE (DEXAMINEE,LOCK);

(* save the personal data *)
WRITE(' ');

RESET (DPINFO,DONEPINFO);
SEEK (DPINFO,COUNT);
DPINFO^ := PINFO;
PUT (DPINFO);
CLOSE (DPINFO,LOCK);

(* update the done subtest results *)

J := COUNT * GMAXSUBTEST;
K := 1 * GMAXSUBTEST;
REPEAT
  WRITE(' ');
  LOADRESULTS (K);
  RESET (DFTESTS,DONERESULTS);
  SEEK (DFTESTS,J);
  DFTESTS^ := TESTS;
  PUT (DFTESTS);
  CLOSE (DFTESTS,LOCK);
  K := K + 1;
  J := J + 1;
UNTIL J >= (COUNT * GMAXSUBTEST + 10);

REMOVEEXAMINEE (1);
COUNT := COUNT + 1;
END; (3)
END; (2)
END; (1)
Writeln;
Writeln;
Writeln (COUNT,' examinees backed up. ');
Writeln;
STALL;
END; (* endofday *)

```

```
(*****)
(*)
(*)      Textfile : EMGR.DIR/E.SUMMARY.TEXT      Volume : TFILES      (*)
(*)      Codefile : E.MGR.CODE ('Include' file)  Volume : CATDATA    (*)
(*)
(*)
(*)
(*)
(*)      File last modified : August 5, 1983      NPROC              (*)
(*)
(*****)
```

```
(* list test scores to file/printer *)
PROCEDURE ESUMMARY;
```

```
CONST NONE = 0;
      B102222 = 1;
      B54321 = 2;
      B108642 = 3;
      TIMED = 4;
```

```
VAR TESTCOUNT,
    K,
    TINDEX,
    SLOT,
    CURRSTRAT,
    RSLT,
    MINUTES,
    SECONDS : INTEGER;
```

```
PRINTER,
SCREEN,
TOFILE : BOOLEAN;
```

```
OPTION : CHAR;
```

```
TNAME,
ENAME,
FNAME : STRING;
```

```
SUMTIME,
SAVETIME : REAL;
```

```
{.....}
```

```
(* list test scores to file *)
PROCEDURE FILEENDSUMMARY(ESLOT : INTEGER);
```

```
VAR MAXLINES,
    DUM,
    LINESOUT : INTEGER;
```

```
{.....}
```

```
(* display examinee personal data *)
```

```
PROCEDURE SHOWEXAMINEE;
VAR J : INTEGER;
```

```
{.....}
```

```
(* display some data *)
```

```
PROCEDURE D1;
```

```
BEGIN
```

```
WITH PINFO DO
```

```
BEGIN (1)
```

```
WRITELN(DEST);
```

```
WRITE(DEST, LASTNAME, ' ');
```

```
WRITE(DEST, FIRSTNAME, ' ');
```

```
WRITE(DEST, MINIMAL);
```

```
WRITE(DEST, EXAMINEE.ID);
```

```
WRITE(DEST, CURRADRESS);
```

```
WRITE(DEST, HOMEOFREC);
```

```
WRITE(DEST, CITIZENSHIP);
```

```
WRITE(DEST, SEX);
```

```
WRITELN(DEST, POPGROUP);
```

```
(* end of first line of compacted data *)
```

```
WRITE(DEST, ETHNIC);
```

```

        WRITE (DEST,MARITAL);
        WRITE (DEST,DEPENDANTS);
        WRITE (DEST,BIRTHDATE);
    END; (1)
END; (* d1 *)

{.....}

BEGIN (* show examinee *)
    D1;
    WITH PINFO DO
    BEGIN (1)
        WRITE (DEST,EDUCATION);
        WRITE (DEST,TESTID);
        WRITE (DEST,AFQT);
        WRITELN (DEST,ASVAB);
        (* end of second line of compact data *)
        WRITE (DEST,ENLISTDATE);
        WRITE (DEST,ACTSERDATE);
        WRITE (DEST,ENL);
        WRITELN (DEST,AFEES);
        (* end of third line of compact data *)
        WRITE (DEST,POSTASVAB);
        WRITE (DEST,BOS);
        WRITE (DEST,STESTORDER(0),STESTORDER(1));
        WRITELN (DEST,EXAMINEE.DATE);
    END; (1)
END; (* showexaminee *)

{.....}

(* check whether coding speed or numerical ops subtest needed to see *)
(* if time info will appear at correct line for SPSS *)
PROCEDURE CHECKTIMEOUT;
BEGIN
    (* Test number minus 1. ie:
        5. Numerical Operations          12. Numerical Operations III
        6. Coding Speed                  13. Numerical Operations IV
        10. Coding Speed II              14. Coding Speed III
        11. Numerical Operations II      15. Coding Speed IV *)
    IF EXAMINEE.TESTORDER(TINDEX) IN (5,6,10,11,12,13,14,15) THEN (a)
    BEGIN (1)
        IF EXAMINEE.TESTORDER(TINDEX) IN (6,10,14,15)
        THEN (b)
            MAXLINES := 7 * EXAMINEE.TESTLENGTH(TINDEX)
        ELSE (b)
            MAXLINES := 3 * EXAMINEE.TESTLENGTH(TINDEX)-1;
        IF LINESOUT < MAXLINES THEN (c)
        BEGIN (2)
            FOR DUM := LINESOUT+1 TO MAXLINES DO
            IF EXAMINEE.TESTORDER(TINDEX) IN (6,10,14,15) THEN (d)
            IF DUM MOD 7 = 0 THEN (e)
            BEGIN (3)
                WRITE (DEST,'Time000 ');
                WRITELN (DEST,SAVETIME : 6 : 1);
                SAVETIME := 0.0;
            END (3)
            ELSE (e)
                WRITE (DEST,'Time000 ')
            ELSE (d)
            BEGIN (4)
                IF DUM MOD 3 = 0 THEN (f)
                BEGIN (5)
                    WRITE (DEST,'Time000 ');
                    WRITELN (DEST,SAVETIME : 6 : 1);
                    SAVETIME := 0.0;
                END (5)
                ELSE (f)
                    WRITE (DEST,'Time000 ');
                IF DUM=MAXLINES THEN (g)
                BEGIN (6)
                    WRITELN (DEST,'',SAVETIME : 6 : 1);
                    SAVETIME := 0.0;
                END (6)
            END (4)
        END (2)
    END (1)
END

```

```

        END; (6)
    END; (4)
END (2)
ELSE (c)
    IF NOT (EXAMINEE.TESTORDER(TINDEX) IN (6,10,14,15))
    THEN (h)
        WRITELN(DEST,'          ',SAVETIME : 6 : 1);

END; (1)
END; (* checktimeout *)

(-----)

PROCEDURE TIME;
BEGIN
    MINUTES := TESTS.STTIME DIV 60;
    SECONDS := TESTS.STTIME MOD 60;

    IF MINUTES > 0
    THEN (a)
        WRITE(DEST,MINUTES:3,':')
    ELSE (a)
        WRITE(DEST,' :');

    IF SECONDS < 10
    THEN (b)
        WRITE(DEST,'0',SECONDS)
    ELSE (b)
        WRITE(DEST,SECONDS:2);

    MINUTES := TESTS.STINSTRTIME DIV 60;
    SECONDS := TESTS.STINSTRTIME MOD 60;

    IF MINUTES > 0
    THEN (c)
        WRITE(DEST,MINUTES:3,':')
    ELSE (c)
        WRITE(DEST,' :');

    IF SECONDS < 10
    THEN (d)
        WRITE(DEST,'0',SECONDS)
    ELSE (d)
        WRITE(DEST,SECONDS:2);

    WRITE(DEST,TESTS.STPROCTCALLS:2);
    (* line 6 of compact data *)
END; (*TIME*)

(-----)

(* send detailed or simple feedback to printer or screen *)
PROCEDURE OUTPUTRESULTS;
VAR J,I,K,TNUM : INTEGER;
    SEVEN : PACKED ARRAY[1..7] OF CHAR;

(.....)

(* get info and write header *)
PROCEDURE INFOHEADER;
VAR SHORT_NAME : STRING;
BEGIN
    RESET(FILEDIRECTORY,INDEXNAME);
    SEEK(FILEDIRECTORY,EXAMINEE.TESTORDER(TINDEX));
    GET(FILEDIRECTORY);
    TNAME := FILEDIRECTORY^.TESTNAME;
    CLOSE(FILEDIRECTORY,LOCK);
    CURRSTRAT := EXAMINEE.STRATEGY(TINDEX);
    SHORT_NAME := 'WHAT'; (* SET A DEFAULT *)

    CASE EXAMINEE.TESTORDER(TINDEX) OF
        0 : SHORT_NAME := ' UK';
        1 : SHORT_NAME := ' GS';
    
```

```

2 : SHORT_NAME := ' AR';
3 : SHORT_NAME := ' MK';
4 : SHORT_NAME := ' PC';
5 : SHORT_NAME := ' NO-1';
6 : SHORT_NAME := ' CS-1';
7 : SHORT_NAME := ' A1';
8 : SHORT_NAME := ' MC';
9 : SHORT_NAME := ' EI';
10 : SHORT_NAME := ' CS-2';
11 : SHORT_NAME := ' NO-2';
12 : SHORT_NAME := ' NO-3';
13 : SHORT_NAME := ' NO-4';
14 : SHORT_NAME := ' CS-3';
15 : SHORT_NAME := ' CS-4';
16 : SHORT_NAME := ' MK-2';
17 : SHORT_NAME := ' S1';
18 : SHORT_NAME := ' MC-2';
19 : SHORT_NAME := ' AR-2';
20 : SHORT_NAME := ' EI-2';
END; (* cases *)

```

```

WRITELN(DEST,SHORT_NAME); (* end of line four of compact data *)
END; (* infoheader *)

```

{-----}

```

PROCEDURE CTOUT;
BEGIN
CASE CURRSTRAT OF
  NONE : WRITELN(DEST,'*****');
  B102222,
  B54321,
  B108642 : BEGIN (1)
    WRITE(DEST,TESTS.ITEMINFO[I].THETA : 2 : 3);
    WRITELN(DEST,TESTS.ITEMINFO[I].ERROR : 2 : 3);
  END; (1)
  TIMED : BEGIN (2)
    IF TESTS.ITEMINFO[I].RTYPE <> SEVENCHR THEN (a)
    BEGIN (3)
      IF ((I+1) > QUESTIONS) OR
      ((I+1) > TESTS.NUMITEMS)
      THEN (b)
        CHECKTIMEOUT
      ELSE (b)
        BEGIN (4)
          IF TESTS.ITEMINFO[I+1].ITEMNUM <= 8
          THEN (c)
            CHECKTIMEOUT
          ELSE (c)
            WRITELN(DEST,
              TESTS.ITEMINFO[I].LATENCY : 6 : 1);
          END; (4)
        END; (3)
      END; (2)
    END; (* cases *)
  END; (* ctout *)

```

{.....}

```

BEGIN (* outputresults *)
INFOHEADER;
I := 0;
SUMTIME := 0.0;
LINESOUT:=0;
WHILE (I <= QUESTIONS) AND (I <= TESTS.NUMITEMS) DO
BEGIN (1)
  IF TESTS.ITEMINFO[I].ITEMNUM > 0 THEN (a)
  BEGIN (2)
    IF TESTS.ITEMINFO[I].RTYPE <> SEVENCHR THEN (b)
    BEGIN (3)
      IF TESTS.ITEMINFO[I].ITEMNUM < 10
      THEN (c)

```

```

        WRITE(DEST,'000')
    ELSE (c)
        IF TESTS.ITEMINFO(I).ITEMNUM < 100
            THEN (d)
                WRITE(DEST,'00')
            ELSE (d)
                IF TESTS.ITEMINFO(I).ITEMNUM < 1000
                    THEN (e)
                        WRITE(DEST,'0');

        WRITE(DEST,TESTS.ITEMINFO(I).ITEMNUM,'*');
    END; (3)

    SAVETIME := TESTS.ITEMINFO(I).LATENCY;
    IF CURRSTRAT = TIMED THEN
        SUMTIME := SUMTIME + SAVETIME;

    CASE TESTS.ITEMINFO(I).RTYPE OF
        CHARVALUE : BEGIN (4)
            CASE TESTS.ITEMINFO(I).RESPONSE OF
                'A' : WRITE(DEST,'1');
                'B' : WRITE(DEST,'2');
                'C' : WRITE(DEST,'3');
                'D' : WRITE(DEST,'4');
                'E' : WRITE(DEST,'5');
            END; (* cases *)
            IF TESTS.ITEMINFO(I).CORRECT
                THEN (f)
                    WRITE(DEST,'1')
                ELSE (f)
                    WRITE(DEST,'0');
            END; (4)
    INTVALUE : BEGIN (5)
        WRITE(DEST,TESTS.ITEMINFO(I).INTRESPONSE : 1);
        IF TESTS.ITEMINFO(I).CORRECT
            THEN (g)
                WRITE(DEST,'1')
            ELSE (g)
                WRITE(DEST,'0');
        END; (5)
    SEVENCHR : BEGIN (6)
        J := TESTS.ITEMINFO(I).ACOUNT;
        FOR K := 1 TO J DO
            BEGIN (7)
                IF TESTS.ITEMINFO(I).ITEMNUM < 10
                    THEN (h)
                        WRITE(DEST,'000')
                    ELSE (h)
                        IF TESTS.ITEMINFO(I).ITEMNUM < 100
                            THEN (i)
                                WRITE(DEST,'00')
                            ELSE (i)
                                IF TESTS.ITEMINFO(I).ITEMNUM < 1000
                                    THEN (j)
                                        WRITE(DEST,'0');
                                WRITE(DEST,TESTS.ITEMINFO(I).ITEMNUM,K);

                CASE TESTS.ITEMINFO(I).CHRRESPONSE(K) OF
                    'A' : WRITE(DEST,'1');
                    'B' : WRITE(DEST,'2');
                    'C' : WRITE(DEST,'3');
                    'D' : WRITE(DEST,'4');
                    'E' : WRITE(DEST,'5');
                END; (* cases *)

                IF TESTS.ITEMINFO(I).ACORRECT(K-1)
                    THEN (k)
                        WRITE(DEST,'1')
                    ELSE (k)
                        WRITE(DEST,'0');

                WRITE(DEST,'*');
                LINESOUT:=LINESOUT+1;
            END; (7)
        END; (6)
    END; (3)

```

```

END; (7)
TNUM := EXAMINEE.TESTORDER(TINDEX);
IF ((I+1) > QUESTIONS) OR
   ((I+1) > TESTS.NUMITEMS) THEN (i)
BEGIN (8)
  IF ((J = 7) AND (TNUM = 10)) OR
     ((J = 3) AND (TNUM = 11)) THEN (m)
  BEGIN (9)
    WRITELN(DEST,
             TESTS.ITEMINFO(I).LATENCY:6:1);

    IF J = 7 THEN (n)
      SAVETIME := 0.0; (* 420.0 - SUMTIME; *)

    IF J = 3 THEN (o)
      SAVETIME := 0.0; (* 180.0 - SUMTIME; *)
  END; (9)
  CHECKTIMEOUT;
END (8)
ELSE (i)
  BEGIN (10)
    IF TESTS.ITEMINFO(I+1).ITEMNUM <= 0 THEN (p)
    BEGIN (11)
      IF ((J = 7) AND (TNUM = 10)) OR
         ((J = 3) AND (TNUM = 11)) THEN (q)

      BEGIN (12)
        WRITELN(DEST,
                 TESTS.ITEMINFO(I).LATENCY:6:1);

        IF J = 7
          THEN (r)
            SAVETIME := 0.0; (* 420.0 - SUMTIME; *)
        IF J = 3
          THEN (s)
            SAVETIME := 0.0; (* 180.0 - SUMTIME; *)
      END; (12)

      CHECKTIMEOUT;
    END (11)
    ELSE (p)
      WRITELN(DEST,TESTS.ITEMINFO(I).LATENCY:6:1);
    END; (10)
  END; (6)
END; (* cases *)
CTOUT;
END; (2)
I := I + 1; (* each I outputs a line 5 of compact data *)
END; (1)
TIME;
IF EXAMINEE.PREDASYAB(TINDEX) < 10.0
THEN
  BEGIN
    WRITE(DEST,' '); (* RIGHT JUSTIFY PASVAB OUTPUT *)
    WRITELN(DEST,EXAMINEE.PREDASYAB(TINDEX):5:2);
  END
ELSE
  WRITELN(DEST,EXAMINEE.PREDASYAB(TINDEX):5:2);
  (* end of line 6 of compact data *)

END; (* outputresults *)

(.....)

BEGIN (* file end summary *)
  ENAME := ' ';
  FOR K := 0 TO 8 DO
    ENAME[K+1] := EXAMINEE.ID(K);
  FNAME := CONCAT('E',ENAME);

```

```

FNAME := CONCAT(FNAME,'.TEXT');
FNAME := CONCAT('QTEXT : ',FNAME);

REWRITE(DEST,FNAME);

(* write personal data to file *)
SHOWEXAMINEE;
SLOT := ESLOT;
RSLT := SLOT * GMAXSUBTEST;
FOR TINDEX := 1 TO GMAXSUBTEST DO
BEGIN (1)
  WRITE('.');
  CURRSTRAT := EXAMINEE.STRATEGY(TINDEX);
  LOADRESULTS(RSLT);
  IF TESTS.NUMITEMS > 0 THEN (a)
  BEGIN (2)
    WRITELN(DEST);
    OUTPUTRESULTS;
  END; (2)
  RSLT := RSLT + 1;
END; (1)
MINUTES := EXAMINEE.TOTTIMECONSOLE DIV 60;
SECONDS := EXAMINEE.TOTTIMECONSOLE MOD 60;
WRITE(DEST,MINUTES:3,' ');
IF SECONDS < 10
  THEN (b)
    WRITE(DEST,'0',SECONDS)
  ELSE (b)
    WRITE(DEST,SECONDS:2);
MINUTES := EXAMINEE.ORIENTATIONTIME DIV 60;
SECONDS := EXAMINEE.ORIENTATIONTIME MOD 60;
WRITE(DEST,MINUTES:3,' ');
IF SECONDS < 10
  THEN (c)
    WRITE(DEST,'0',SECONDS)
  ELSE (c)
    WRITE(DEST,SECONDS:2);
WRITELN(DEST,EXAMINEE.NUMPROC:2);
WRITELN(DEST);
CLOSE(DEST,LOCK);
END; (* file end summary *)

(-----)

(* display examinee personal data *)
PROCEDURE SHOWEXAMINEE;
VAR J : INTEGER;

(.....)

(* display some data *)
PROCEDURE D1;
BEGIN
  WITH PINFO DO
  BEGIN (1)
    WRITELN(DEST,'
                                EXAMINEE PERSONAL DATA');
    WRITE(DEST,'Last Name');
    WRITE(DEST,' : ',LASTNAME);
    WRITE(DEST,'First Name');
    WRITE(DEST,' : ',FIRSTNAME);
    WRITE(DEST,'Middle Initial');
    WRITELN(DEST,' : ',MINITIAL);
    WRITELN(DEST,'Social Security # : ',EXAMINEE.ID);
    WRITE(DEST,'Current Address (State)');
    WRITE(DEST,' : ',CURRADRESS);
    WRITE(DEST,'Home of Record (State)');
    WRITELN(DEST,' : ',HOMEOFREC);
    WRITE(DEST,'Citizenship');
    WRITE(DEST,' : ',CITIZENSHIP);
    WRITE(DEST,'Sex');
    WRITELN(DEST,' : ',SEX);
    WRITE(DEST,'Population Group');
    WRITE(DEST,' : ',POPGROUP);
  END; (1)
END;

```

```

        WRITE(DEST,'                Ethnic Group');
        WRITELN(DEST,' : ',ETHNIC);
        WRITE(DEST,'Marital Status');
        WRITELN(DEST,' : ',MARITAL);
        WRITE(DEST,'Number of Dependents');
        WRITELN(DEST,' : ',DEPENDANTS);
        WRITE(DEST,'Date of Birth');
        WRITELN(DEST,' : ',BIRTHDATE);
    END; (1)
END; (* d1 *)

{.....}

BEGIN (* show examinee *)
    IF SCREEN
        THEN (a)
            PAGE(OUTPUT);
    D1;
    WITH PINFO DO
        BEGIN (1)
            WRITE(DEST,'Education');
            WRITELN(DEST,' : ',EDUCATION);
            WRITE(DEST,'Test Id');
            WRITELN(DEST,' : ',TESTID);
            WRITE(DEST,'AFQT');
            WRITELN(DEST,' : ',AFQT);
            WRITE(DEST,'ASVAB Scores');
            WRITELN(DEST,' : ',ASVAB);
            WRITE(DEST,'Date of Enlistment');
            WRITELN(DEST,' : ',ENLISTDATE);
            WRITE(DEST,'Active Service Date');
            WRITELN(DEST,' : ',ACTSERDATE);
            WRITE(DEST,'Rating / MOS');
            WRITELN(DEST,' : ',ENL);
            WRITE(DEST,'AFES');
            WRITELN(DEST,' : ',AFES);
            WRITE(DEST,'Branch of Service');
            WRITELN(DEST,' : ',BOS);
            WRITE(DEST,'Retest ASVAB');
            WRITELN(DEST,' : ',POSTASVAB);
            WRITE(DEST,'Test Order');
            WRITELN(DEST,' : ',STESTORDER(0),STESTORDER(1));
        END; (1)
    END; (* showexaminee *)

{-----}

(* send detailed or simple feedback to printer or screen *)
PROCEDURE OUTPUTRESULTS;
VAR J,I,K : INTEGER;
    SEVEN : PACKED ARRAY[1..7] OF CHAR;

{.....}

(* get info and write header *)
PROCEDURE INFOHEADER;
BEGIN
    IF SCREEN
        THEN (a)
            PAGE(OUTPUT);
    RESET(FILEDIRECTORY,TINDEXNAME);
    SEEK(FILEDIRECTORY,EXAMINEE.TESTORDER(TINDEX));
    GET(FILEDIRECTORY);
    TNAME := FILEDIRECTORY^.TESTNAME;
    CLOSE(FILEDIRECTORY,LOCK);

    CURRSTRAT := EXAMINEE.STRATEGY(TINDEX);

    WRITELN(DEST,' :25,Test : ',TNAME);
    WRITELN(DEST);
    WRITE(DEST,'Item #      Response(s) Correct      Ability      Variance');
    WRITELN(DEST,' Elapsed Time (sec)');
    WRITE(DEST,'-----      -----      -----      -----      -----');

```

```

        WRITELN(DEST,' -----');

END;  (* infoheader *)

{-----}

(* display time information *)
PROCEDURE TIMEINFO;
BEGIN
    WRITELN(DEST);
    MINUTES := TESTS.STTIME DIV 60;
    SECONDS := TESTS.STTIME MOD 60;
    WRITE(DEST,'Elapsed Time for subtest : ');
    IF MINUTES > 0
    THEN (a)
        WRITE(DEST,MINUTES,' minute(s) and ');
    WRITELN(DEST,SECONDS,' second(s).');
    MINUTES := TESTS.STINSTRTIME DIV 60;
    SECONDS := TESTS.STINSTRTIME MOD 60;
    WRITE(DEST,'Elapsed time for instructions : ');
    IF MINUTES > 0
    THEN (b)
        WRITE(DEST,MINUTES,' minute(s) and ');
    WRITELN(DEST,SECONDS,' second(s).');
    WRITELN(DEST,'# of Subtest proctor calls : ',TESTS.STPROCTCALLS);
    IF SCREEN THEN (c)
    BEGIN (1)
        WRITELN;
        STALL;
    END; (1)
END;  (* timeinfo *)

{.....}

BEGIN (* outputresults *)

INFOHEADER;
I := 0;
WHILE (I <= QUESTIONS) AND (I <= TESTS.NUMITEMS) DO
BEGIN (1)
    IF TESTS.ITEMINFO[I].ITEMNUM > 0 THEN (a)
    BEGIN (2)
        IF TESTS.ITEMINFO[I].RTYPE <> SEVENCHR
        THEN (b)
            WRITE(DEST,TESTS.ITEMINFO[I].ITEMNUM : 4);

        CASE TESTS.ITEMINFO[I].RTYPE OF
            CHARVALUE : BEGIN (3)
                WRITE(DEST,TESTS.ITEMINFO[I].RESPONSE : 10);
                IF TESTS.ITEMINFO[I].CORRECT
                THEN (c)
                    WRITE(DEST,'          Yes  ');
                ELSE (c)
                    WRITE(DEST,'          No   ');
            END; (3)
            INTVALUE  : BEGIN (4)
                WRITE(DEST,TESTS.ITEMINFO[I].INTRESPONSE : 11);
                IF TESTS.ITEMINFO[I].CORRECT
                THEN (d)
                    WRITE(DEST,'          Yes  ');
                ELSE (d)
                    WRITE(DEST,'          No   ');
            END; (4)
            SEVENCHR  : BEGIN (5)
                J := TESTS.ITEMINFO[I].ACOUNT;
                FOR K := 1 TO J DO
                BEGIN (6)
                    WRITE(DEST,TESTS.ITEMINFO[I].ITEMNUM : 4);
                    WRITE(DEST,K,' :10);
                    WRITE(DEST,TESTS.ITEMINFO[I].CHRESPONSE(K));
                    IF TESTS.ITEMINFO[I].ACORRECT(K-1)
                    THEN (e)
                        WRITE(DEST,'          Yes  ');
                END; (6)
            END; (5)
        END; (2)
    I := I + 1;
END; (1)

```

```

        ELSE (a)
            WRITE (DEST, '          No ');
            WRITE (DEST, '          ***** ');
            IF K = J
                THEN (f)
                    WRITELN (DEST, TESTS.ITEMINFO[I].LATENCY : 9:1)
                ELSE (f)
                    WRITELN (DEST, '          ***** ');
            END; (6)
            WRITELN (DEST);
        END; (5)
    END; (* cases *)

CASE CURRSTRAT OF
    NONE : WRITELN (DEST, '          ***** ');
    B102222,
    B54321,
    B108642 : BEGIN (7)
        WRITE (DEST, TESTS.ITEMINFO[I].THETA : 12 : 3);
        WRITE (DEST, TESTS.ITEMINFO[I].ERROR : 12 : 3);
        WRITELN (DEST, '          ***** ');
    END; (7)
    TIMED : BEGIN (8)
        IF TESTS.ITEMINFO[I].RTYPE <> SEVENCHR THEN (g)
            BEGIN (9)
                WRITE (DEST, '          ***** ');
                WRITELN (DEST, TESTS.ITEMINFO[I].LATENCY : 9 : 1);
            END; (9)
        END; (8)
    END; (* cases *)
END; (2)
I := I + 1;
END; (1)
TIMEINFO;
END; (* outputresults *)

(-----)

(* get which examinee and where to send summary *)
PROCEDURE WHOANDWHERE;
BEGIN
    LOADINDEX;
    ENTERID;
    SLOT := DIRINDEXNUM (EXAMINEE.ID);

    IF SLOT < 0 THEN (a)
        BEGIN (1)
            GOTOXY (0,12);
            WRITELN ('No record in file with ID ', EXAMINEE.ID);
            WRITELN;
            STALL;
            EXIT (ESUMMARY);
        END (1)
    ELSE (a)
        BEGIN (2)
            PAGE (OUTPUT);
            GOTOXY (18,0);
            WRITE ('OUTPUT SELECT MENU');
            GOTOXY (0,4);
            WRITE ('Select one of the following options by entering its number. ');
            GOTOXY (16,9);
            WRITE ('1. QUIT');
            GOTOXY (16,10);
            WRITE ('2. SUMMARY TO CONSOLE');
            GOTOXY (16,11);
            WRITE ('3. SUMMARY TO PRINTER');
            GOTOXY (16,12);
            WRITE ('4. SUMMARY TO FILE');
            GOTOXY (16,16);
            WRITE ('Enter Choice # : ');
            OPTION := GETCHAR ('1'..'4', TRUE, TRUE, TRUE);

```

```

TOFILE := FALSE;
SCREEN := FALSE;
PRINTER := FALSE;

CASE OPTION OF
  '1' : EXIT(ESUMMARY);
  '2' : BEGIN (3)
        REWRITE(DEST,'CONSOLE : ');
        SCREEN := TRUE;
        END; (3)
  '3' : BEGIN (4)
        PRINTER := TRUE;
        REWRITE(DEST,UNITNUMPRINTER);
        END; (4)
  '4' : BEGIN (5)
        TOFILE := TRUE;
        PAGE(OUTPUT);
        WRITE('Writing examinee records to file .');
        LOADEXAMINEE(SLOT);
        LOADPDATA(SLOT);
        FILEENDSUMMARY(SLOT);
        END; (5)
END; (* cases *)
END; (2)
END; (* who and where *)

[.....]

BEGIN (* examinee summary *)

  (* get which examinee *)
  WHOANDWHERE;

  IF NOT TOFILE THEN (a)
  BEGIN (1)

    (* load examinee testtaking info *)
    LOADEXAMINEE(SLOT);

    (* load examinee personal data *)
    LOADPDATA(SLOT);

    SHOWEXAMINEE;
    IF SCREEN THEN (b)
    BEGIN (2)
      WRITELN(DEST);
      STALL;
      PAGE(OUTPUT);
    END (2)
    ELSE (b)
      FOR K := 1 TO 5 DO
        WRITELN(DEST);
      RSLT := SLOT * GMAXSUBTEST;
      TESTCOUNT := 0;
      IF EXAMINEE.LASTTEST <> GMAXSUBTEST THEN (c)
      BEGIN (3)
        FOR TINDEX := 1 TO GMAXSUBTEST DO
          BEGIN (4)
            CURRSTRAT := EXAMINEE.STRATEGY(TINDEX);
            LOADRESULTS(RSLT);
            IF TESTS.NUMITEMS > 0 THEN (d)
            BEGIN (5)
              TESTCOUNT := TESTCOUNT + 1;
              IF NOT SCREEN THEN (e)
              BEGIN (6)
                FOR K := 1 TO 80 DO
                  WRITE(DEST,'*');
                WRITELN(DEST);
                WRITELN(DEST);
              END; (6)
              OUTPUTRESULTS;
              FOR K := 1 TO 2 DO WRITELN(DEST);
            END; (5)
          END; (4)
        END; (3)
      END; (c)
    END; (d)
  END; (b)
END; (1)

```

```

        RSLOT := RSLOT + 1;
    END; (4)
END; (3)
IF SCREEN
    THEN (f)
        PAGE(OUTPUT)
    ELSE (f)
        BEGIN (7)
            FOR K := 1 TO 80 DO
                WRITE(DEST,'*');
                WRITELN(DEST);
                WRITELN(DEST);
            END; (7)
        IF TESTCOUNT <> 0 THEN (g)
            BEGIN (8)
                MINUTES := EXAMINEE.TOTTIMECONSOLE DIV 60;
                SECONDS := EXAMINEE.TOTTIMECONSOLE MOD 60;
                WRITELN(DEST,'Total session elapsed time : ',MINUTES,' minute(s) and ',
                    SECONDS,' second(s).');
                MINUTES := EXAMINEE.ORIENTATIONTIME DIV 60;
                SECONDS := EXAMINEE.ORIENTATIONTIME MOD 60;
                WRITELN(DEST,'Familiarization elapsed time : ',MINUTES,' minute(s) and ',
                    SECONDS,' second(s).');
                WRITELN(DEST,'# session proctor calls : ',EXAMINEE.NUMPROC);
                WRITELN(DEST);
            END (8)
        ELSE (g)
            BEGIN (9)
                WRITELN(DEST);
                WRITELN(DEST);
                WRITELN(DEST,'Examinee has not taken any subtests.');
```

```
(*****)
(*      Textfile : EMGR.DIR/E.ZERO.TEXT      Volume : TFILES      *)
(*      Codefile : E.MGR.CODE ('Include' file) Volume : CATDATA    *)
(*      DEC. 1, 1982      NPRODC      *)
(*****)
```

(\*\*\* initialize the directory of a file \*\*\*)

PROCEDURE ZERO DIRECTORY;

VAR MAXRECORDS,

I : INTEGER;

{.....}

(\* zero out the examinee directory \*)

PROCEDURE ZAPINDEX;

BEGIN

FOR I := 0 TO MAXEXAMINEE DO

DIR[I].UNUSED := TRUE;

RESET(FILEDIR, INDEXNAME);

SEEK(FILEDIR, 0);

FILEDIR^ := DIR;

PUT(FILEDIR);

CLOSE(FILEDIR, LOCK);

END; (\* zap index \*)

{-----}

(\* zero out the examinee test taking information \*)

PROCEDURE ZAPTESTINFO;

BEGIN

RESET(FILEEXAMINEE, INFONAME);

SEEK(FILEEXAMINEE, 0);

FOR I := 0 TO MAXEXAMINEE DO

BEGIN (1)

FILEEXAMINEE^ := EXAMINEE;

PUT(FILEEXAMINEE);

END; (1)

CLOSE(FILEEXAMINEE, LOCK);

END; (\* zaptestinfo \*)

{-----}

(\* zap the personal info of examinee \*)

PROCEDURE ZAPPERSONALINFO;

BEGIN

RESET(PINFOFILE, PINFO NAME);

SEEK(PINFOFILE, 0);

FOR I := 0 TO MAXEXAMINEE DO

BEGIN (1)

PINFOFILE^ := PINFO;

PUT(PINFOFILE);

END; (1)

CLOSE(PINFOFILE, LOCK);

END; (\* zappersonalinfo \*)

{-----}

(\* zap examinee test results \*)

PROCEDURE ZAPRESULTS;

VAR J, K : INTEGER;

BEGIN

K := (MAXEXAMINEES \* STESTS) + STESTS;

RESET(FILETESTS, RESULTS);

SEEK(FILETESTS, 0);

WRITELN;

FOR I := 0 TO K DO

BEGIN (1)

IF (I MOD 5) = 0 THEN WRITE(' ');

FILETESTS^ := TESTS;

```

        PUT(FILETESTS);
        END; (1)
        CLOSE(FILETESTS,LOCK);
    END; (* zapresults *)

    (.....)

BEGIN (* zero directory *)
    PAGE(OUTPUT);
    SQUAWK;
    GOTOXY(16,2);
    WRITE('***** WARNING *****');
    GOTOXY(8,5);
    WRITELN(
        'You have selected the purge directory option. This will flush away all');
    WRITELN('existing examinee data in the files listed below. ');
    GOTOXY(7,9);
    WRITE(INDEXNAME);
    GOTOXY(7,10);
    WRITE(INFONAME);
    GOTOXY(7,11);
    WRITE(RESULTS);
    GOTOXY(7,12);
    WRITE(PINFONAME);
    GOTOXY(8,14);
    IF BACKUP THEN
        WRITE('These are the DONE EXAMINEE files. ')
    ELSE
        WRITE('These are the SESSION files. ');
    WRITELN;
    WRITE('Do you wish to purge these files? (Press ''N'' or ''Y'') : ');
    IF GETCHAR(['y','n','y','n'],TRUE,TRUE,TRUE) IN ['y','y'] THEN
        BEGIN (1)
            WRITELN;
            WRITELN;
            WRITELN('Last chance !!!!!!!!!');
            SQUAWK;
            WRITE('Are you sure you want to purge ? (Press ''N'' or ''Y'') : ');
            IF GETCHAR(['y','n','y','n'],TRUE,TRUE,TRUE) IN ['y','y'] THEN
                BEGIN (2)
                    PAGE(OUTPUT);
                    WRITE('Purging files. ');
                    INITEREC;
                    ZAPINDEX;
                    ZAPTESTINFO;
                    ZAPPERSONALINFO;
                    ZAPRESULTS;

                    END; (2)
                END; (1)
            END; (* zero directory *)

```

**SMGR.DIR:**  
**Subdirectory - Strategy Manager Textfiles**



```
(*****)
(*)
(*)      Textfile : SMGR.DIR/S.MGR.TEXT          Volume : TFILES          (*)
(*)      Codefile : S.MGR.CODE TRAT             Volume : CATDATA          (*)
(*)
(*)
(*)
(*) File last modified : Feb 23, 1983          NPRDC          (*)
(*)
(*) This program allows access to the various data structures used by the (*)
(*) different strategies of computer adaptive testing methods. Through this (*)
(*) access, one can see how the strategies are set up, change data in the (*)
(*) files, or enter new data. Currently, only infotables for the Bayesian (*)
(*) method are implemented.          (*)
(*****)
```

```
(**$***)
PROGRAM STRATEGY;
USES CHAINSTUFF,
    REALMODES,
    TRANSCEND;
```

```
CONST (* ascii values *)
    ETX = 3;
    BELL = 7;
    NUL = 0;
    LARROW = 8;
    RARROW = 21;
    RET = 13;
    UP = 11;
    DOWN = 10;
    ESC = 27;
    SPACE = 32;
    NIL = -1;
    ASCIIOFFSET = 48; (* ascii zero *)
    MAXLINEBUF = 79; (* string buffer size *)

    (* infotable size *)
    TMIN = -2.25; (* Lowest value of ability level, Theta *)
    DT = 0.125; (* Increment value -- Theta in each row in table is DT
                larger than previous row *)

    (* test directory name *)
    INDEXNAME = 'CATDATA:TESTINDEX.DATA'; (* test directory *)
    DATANAME = 'CATDATA:ITEMPOOL.DATA'; (* Question directory *)

    (* slots available in directory *)
    MAXSUBTESTS = 20;

    (* maximum question pool per test *)
    MAXITEMPOOL = 300;

    (* maximum # of sample questions *)
    MAXSAMPLES = 5;

    UNITNUMPRINTER = 'PRINTER';

    DEFAULTFILE = 'STRAT-INFO.TEXT';

    VERSION = '[1.03]';
```

```
TYPE DIRDATA = PACKED RECORD (* directory for tests *)
    UNUSED : BOOLEAN;
    TESTNAME : STRING;
    ITEMCODE : PACKED ARRAY
                [0..MAXITEMPOOL]
                OF INTEGER;
END;
```

```
(* type of question response *)
SEVENTYPE = PACKED ARRAY[1..7] OF CHAR;
```

```
(* Different types of ways to answer a question *)
ITEMRESPONSES = (CHARVALUE, (* normal multiple choice *)
                 INTVALUE, (* Integer value as answer *)
```

```

SEVENCHR);      (* seven characters saved as answer *)

(* question ptrs/data , information for each question *)
ITEMDATA = PACKED RECORD

    (* flags if graphics item *)
    GRAPHICS : BOOLEAN;

    (* valid response ranges for multiple choice *)
    LOWANSWER,
    HIGHANSWER : CHAR;

    (* block # in file where text starts *)
    ITEMBLOCK,

    (* byte # in block where text starts *)
    ITEMPTR,

    (* # of answers if multiple question screen *)
    ANSWERCOUNT : INTEGER;

    (* information parameters for bayesian strategy *)
    A,B,C,

    (* currently unused *)
    PROPCORRECT,
    POINTBISERIAL,
    YOPT,
    XOPT,
    DUMMY1,
    DUMMY2,
    DUMMY3 : REAL;

    (* correct answer to question *)
    CASE ATYPE : ITEMRESPONSES OF
        CHARVALUE : (ANSWER : CHAR);
        INTVALUE  : (INTANSWER : INTEGER);
        SEVENCHR  : (CHRANSWER : SEVENTYPE);
    END;

SETOFCHAR = SET OF CHAR;

VAR LETTERS,DIGITS,CHARACTERS : SET OF CHAR;
    output,
    COMMAND : CHAR;

    ESCPROC : BOOLEAN;

    (* string character buffer *)
    LINEBUF : PACKED ARRAY[0..MAXLINEBUF] OF CHAR;

    CURRINDEXRECNUM : INTEGER;  (* record # of file directory *)

    (* test directory *)
    DIRECTORY : DIRDATA;
    FILEDIRECTORY : FILE OF DIRDATA;

    (* test question ptrs/data *)
    ITEMINFO : ITEMDATA;
    FILEITEMINFO : FILE OF ITEMDATA;

    (* output file for test listings *)
    DEST : TEXT;

    (* directory record information *)
    DIRINFO : ARRAY[0..MAXSUBTESTS] OF RECORD

        (* record occupied *)
        NOTUSED : BOOLEAN;

        (* subtest name *)
        TNAME : STRING;

```

```

                                (* # items in subtest *)
                                ITEMCOUNT : INTEGER;
                                END;

(* .....*)

(* This procedure is called by most of the other procedures. It clears *)
(* the console screen. *)
PROCEDURE PAGE(DUMMY : CHAR);
BEGIN
    WRITE(CHR(28));
    GOTOXY(0,0);
END;

(* ----- *)

(*$! /TFILES/SMGR.DIR/S.UTL.TEXT *)      (* utility procedures *)

(* ----- *)

(* This procedure writes the directory information to a record. *)
(* It puts into an array the names of the subtests. If a test had been *)
(* deleted from the file, there will be no name in the array location *)
(* corresponding to the place in the file where it had been, and a *)
(* boolean is set to indicate that it is blank. *)
(* This procedure is called by: Program STRATEGY main routine *)

PROCEDURE GETDIRINFO;
VAR I,K,ICOUNT : INTEGER;
    (* all other variables are global to Program STRATEGY *)

BEGIN (* get dir info *)

    (* initialize the directory information *)
    FOR I := 0 TO MAXSUBTESTS DO
        DIRINFO[I].NOTUSED := TRUE;

    (* get the directory information *)
    I := 0;
    RESET(FILEDIRECTORY,INDEXNAME);
    REPEAT
        SEEK(FILEDIRECTORY,I);
        GET(FILEDIRECTORY);

        IF NOT (FILEDIRECTORY^.UNUSED)
            THEN
                BEGIN (1)
                    DIRECTORY := FILEDIRECTORY^;
                    DIRINFO[I].NOTUSED := FALSE;
                    DIRINFO[I].TNAME := DIRECTORY.TESTNAME;
                    ICOUNT := 0;
                    DIRINFO[I].ITEMCOUNT := ICOUNT;
                END; (1)

        I := I + 1;
    UNTIL I > MAXSUBTESTS;
    CLOSE(FILEDIRECTORY,NORMAL);
END; (* getdirinfo *)

(* ----- *)

(* Given a question code, this function returns the location *)
(* of the question's data, & text pointers. *)
(* This function is called by: Procedure ? *)

FUNCTION SLOT(CODE : INTEGER) : INTEGER;
VAR INDEX : INTEGER;
    FOUND : BOOLEAN;
    (* All other variables are global to Program STRATEGY *)

BEGIN (* slot *)
    INDEX := MAXSAMPLES + 1;
    FOUND := FALSE;

```

```

REPEAT
  IF DIRECTORY.ITEMCODE(INDEX) = CODE
  THEN
    FOUND := TRUE
  ELSE
    INDEX := INDEX + 1;
  UNTIL (INDEX > MAX(TEMPPOOL) OR (FOUND);

  IF FOUND
  THEN
    SLOT := INDEX
  ELSE
    SLOT := NIL;      (* nil here is not a pointer, but an integer *)
END;  (* slot *)

(* ----- *)

(* This procedure lists the names of the tests that are in the database, *)
(* and loads the record containing itemcode numbers for the single test *)
(* selected. This procedure is called by the following procedures : *)
(* NEWINFO in textfile STRAT-NEW, LISTINFO in textfile STRAT-LIST, *)
(* VERIFY in textfile STRAT-VERF, MODIFYINFO in textfile STRAT-MODF, and *)
(* FINDINFO in textfile STRAT-FIND. *)

PROCEDURE LOADTEST(MESSAGE : STRING);
(* Constant MAXSUBTESTS is global to Program STRATEGY. *)
VAR Q,
    TESTNUM,
    RECNUM : INTEGER;
    OKTEST : BOOLEAN;
    TEXTCODE : CHAR;
    (* All other variables are global to Program STRATEGY. *)

    (* ..... *)

    (* This procedure lists a directory of the test names to the screen. *)
    (* This procedure is called by: Procedure LOADTEST *)

PROCEDURE LISTTESTS;
(* Constant MAXSUBTESTS is global to Program STRATEGY. *)
VAR I, J : INTEGER;
    (* DIRINFO.NOTUSED and .TNAME are global to Program STRATEGY. *)

BEGIN (* list tests *)
  PAGE(OUTPUT);
  GOTOXY(24,0);
  WRITE('LIST OF SUBTESTS');
  I := 0;
  J := 0;
  GOTOXY(0,3);

  REPEAT
    IF NOT (DIRINFO[I].NOTUSED)      (* The test exists *)
    THEN
      BEGIN (1)
        J := J + 1;
        IF J <= 10
        THEN
          GOTOXY(0,2+J)
        ELSE
          GOTOXY(40,2+J-10);
        WRITE(J, ' ', DIRINFO[I].TNAME);
      END; (1)
      I := I + 1;
    UNTIL I > MAXSUBTESTS;
  END; (* listtests *)

  (* ..... *)

BEGIN (* loadtest *)
  OKTEST := FALSE;
  LISTTESTS;

```

```

RESET(FILEDIRECTORY,INDEXNAME);

REPEAT
  GOTOXY(0,15);
  WRITELN('INSTRUCTIONS : Enter choice #, then press <RET>');
  WRITE('                                To escape, press 0 then <RET>');
  GOTOXY(0,18);
  WRITE(MESSAGE);
  (*$1-*)
  READLN(TESTNUM);
  (*$1+*)

  IF TESTNUM = 0
    THEN
      BEGIN (1)
        ESCPROC := TRUE;
        CLOSE(FILEDIRECTORY,LOCK);
        EXIT(LOADTEST);
      END; (1)

  IF (TESTNUM < 0) OR (TESTNUM > (MAXSUBTESTS+1))
    THEN
      BEGIN (2)
        WRITELN;
        WRITELN('Invalid test # : ',TESTNUM);
        SQUAWK; (* Procedure located in "include" file T-UTL *)
        WRITELN;
        STALL; (* Procedure located in "include" file T-UTL *)
      END (2)
    ELSE
      BEGIN (3)
        RECNUM := 0;
        Q := 0;

        REPEAT
          SEEK(FILEDIRECTORY,RECNUM);
          GET(FILEDIRECTORY);
          IF NOT (FILEDIRECTORY^.UNUSED) THEN Q := Q + 1;
          RECNUM := RECNUM + 1;
        UNTIL (Q = TESTNUM) OR (RECNUM > MAXSUBTESTS);

        IF Q = TESTNUM
          THEN
            BEGIN (4)
              CURRINDEXRECNUM := RECNUM - 1;
              OKTEST := TRUE;
            END (4)
          ELSE
            BEGIN (5)
              WRITELN;
              WRITELN('No test loaded');
              WRITELN;
              STALL; (* Procedure located in "include" file T-UTL *)
            END; (5)
          END; (3)
        IF NOT OKTEST THEN BLANKLINES(18,6,18);
      UNTIL OKTEST;

      SEEK(FILEDIRECTORY,CURRINDEXRECNUM);
      GET(FILEDIRECTORY);
      DIRECTORY := FILEDIRECTORY^;
      CLOSE(FILEDIRECTORY,LOCK);
    END; (* Loadtest *)

  (* ----- *)

  (* Show command level selections *)
  (* This procedure is called by Program STRATEGY main routine. *)

PROCEDURE MENU;
BEGIN
  PAGE(OUTPUT);
  GOTOXY(20,0);

```

```

WRITE('STRATEGY DATABASE MENU ',VERSION);
GOTOXY(8,4);
WRITE('Select one of the following options by entering its number. ');
GOTOXY(16,8);
WRITE('1. QUIT');
GOTOXY(16,9);
WRITE('2. INFO TABLE MANAGEMENT');
GOTOXY(16,10);
WRITE('3. PYRAMIDAL MANAGEMENT');
GOTOXY(16,11);
WRITE('4. FLEXILEVEL MANAGEMENT');
GOTOXY(16,15);
WRITE('Enter Choice # : ');
END; (* menu *)

```

(\* ----- \*)

(\* This procedure is called by Program STRATEGY main routine. \*)

```

PROCEDURE INFOSETUP;
CONST(* information tables *)
  TABNAME = 'CATDATA:TABINFO.DATA';

  (* output file for table listing *)
  DEFAULTFILE = 'CATDATA:INFO.RSLTS.TEXT';

  (* information table dimensions *)
  INFOROW = 36;
  INFOCOLUMN = 20;

TYPE TABLE = ARRAY[1..INFOCOLUMN,1..INFOROW] OF INTEGER;
PARAMETER = PACKED RECORD
  ITEM : INTEGER;
  A,      (* Discrimination parameter *)
  B,      (* Difficulty parameter *)
  C : REAL; (* Guessing coefficient *)
END;

SORTTYPE = PACKED RECORD
  ITEM : INTEGER;
  INFOVALUE : REAL;
END;

```

```

VAR N,
  MINITEMPOOL : INTEGER;
  TESTPARAM : PACKED ARRAY[MAXSAMPLES..MAXITEMPOOL] OF PARAMETER;
  SORTARRAY : PACKED ARRAY[0..MAXITEMPOOL] OF SORTTYPE;
  COMMAND : CHAR;
  INFOTABLE : TABLE;
  INFOFILE : FILE OF TABLE;
  OTHERINFO : BOOLEAN;

```

(\* ..... \*)

(\* This procedure updates the information table file for subtest. \*)  
 (\* This procedure is called by: Procedure \*)

```

PROCEDURE UPDATEINFO(RECNUM : INTEGER);
(* Constant TABNAME is defined in Procedure INFOSETUP. INFOTABLE and *)
(* INFOFILE are declared in Procedure INFOSETUP. INFOTABLE is an *)
(* array whose values are determined in Procedure *)

```

```

BEGIN (* update info *)
  RESET(INFOFILE,TABNAME);
  SEEK(INFOFILE,RECNUM);
  INFOFILE^ := INFOTABLE;
  PUT(INFOFILE);
  CLOSE(INFOFILE,LOCK);
END; (* updateinfo *)

```

(\* ----- \*)

(\* This procedure loads the information table for a subtest. \*)

(\* This procedure is called by: Procedure \*)

```
PROCEDURE LOADINFO(RECNUM : INTEGER);
(* Constant TABNAME is defined in Procedure INFOSETUP. INFOTABLE and *)
(* INFOFILE are declared in Procedure INFOSETUP. INFOTABLE is an *)
(* array. *)
```

```
BEGIN
  RESET(INFOFILE,TABNAME);
  SEEK(INFOFILE,RECNUM);
  GET(INFOFILE);
  INFOTABLE := INFOFILE^;
  CLOSE(INFOFILE,NORMAL);
END; (* loadinfo *)
```

(\* ----- \*)

(\* This procedure formats a screen display to enter or modify \*)  
 (\* information table items manually. \*)  
 (\* This procedure is called by: Procedure MODIFYINFO \*)

```
PROCEDURE FORMATSREEN;
VAR I : INTEGER;
BEGIN
  PAGE(OUTPUT);
  GOTOXY(18,1);
  WRITELN('1', ' ':18,'20');
  GOTOXY(17,2);
  WRITELN(' ');
  GOTOXY(15,3);
  WRITE('1');
  FOR I := 1 TO 17 DO
    BEGIN (1)
      GOTOXY(17,I+2);
      WRITELN(' | ');
    END; (1)
  GOTOXY(14,20);
  WRITELN('36 | ');
  GOTOXY(8,5);
  WRITELN('Row : ');
  WRITELN;
  WRITELN('Column : ');
  WRITELN;
  WRITELN('Value : ');
END; (* format screen *)
```

(\* ----- \*)

(\* This function is called by: Procedure Param\_Array \*)

```
FUNCTION HASH(KEY : INTEGER) : INTEGER;
BEGIN
  HASH := (CURRINDEXRECNUM * MAXITEMPOOL)
    + KEY + CURRINDEXRECNUM;
END; (* Hash *)
```

(\* ----- \*)

(\* This procedure gets the a,b & c parameters of the desired subtest \*)  
 (\* from the file database. \*)  
 (\* This procedure is called by: Procedure Newinfo \*)

```
PROCEDURE PARAM_ARRAY;
(* Constants DATANAME, MAXITEMPOOL, & MAXSAMPLES are global to *)
(* Program STRATEGY. *)
VAR MINITEMPOOL,I : INTEGER;
(* DIRECTORY, FILEITEMINFO & ITEMINFO are global to *)
(* Program STRATEGY. TESTPARAM is declared in Procedure INFOSETUP *)
(* DIRECTORY is set in Procedure LOADTEST. *)
```

```
BEGIN (* param array *)
  (* Get all data items for this test *)
  WRITELN;
```

```

WRITELN('LOADING PARAMETERS FROM FILE. ');
RESET(FILEITEMINFO,DATANAME);
MINITEMPOOL:= MAXSAMPLES + 1;
I:=HASH(MINITEMPOOL);
SEEK(FILEITEMINFO,I);
FOR I := MINITEMPOOL TO MAXITEMPOOL DO
BEGIN (1)
  IF (I MOD 10) = 0 THEN WRITE('. ');

  (* Put item, a, b, c into an array *)
  GET(FILEITEMINFO);
  ITEMINFO := FILEITEMINFO^;
  TESTPARAM[I].ITEM := DIRECTORY.ITEMCODE[I];

  (* Need the parameters only for valid items *)
  IF TESTPARAM[I].ITEM >= 0
  THEN
    BEGIN (2)
      TESTPARAM[I].A := ITEMINFO.A;
      TESTPARAM[I].B := ITEMINFO.B;
      TESTPARAM[I].C := ITEMINFO.C;
    END; (2)
END; (1)
CLOSE(FILEITEMINFO,LOCK);
END; (* Param_Array *)

(* ----- *)
(* File containing procedure Verify *)
(*$I /TFILES/SMGR.DIR/S.VERF.TEXT *)

(* File containing procedure Newinfo *)
(*$I /TFILES/SMGR.DIR/S.NEW.TEXT *)

(* File containing procedure Listinfo *)
(*$I /TFILES/SMGR.DIR/S.LIST.TEXT *)

(* File containing procedure Modifyinfo *)
(*$I /TFILES/SMGR.DIR/S.MODIF.TEXT *)

(* File containing procedure Findinfo *)
(*$I /TFILES/SMGR.DIR/S.FIND.TEXT *)

(* File containing procedure Analyzes *)
(*$I /TFILES/SMGR.DIR/S.ANALYZE.TEXT *)

(* ----- *)

(* This procedure shows command level selections *)
(* It is called from : Procedure Infosetup *)

PROCEDURE INFOMENU;
BEGIN
  PAGE(OUTPUT);
  GOTOXY(20,0);
  WRITE('INFOTABLE MANAGER MENU');
  GOTOXY(0,4);
  WRITE('Select one of the following options by entering its number. ');
  GOTOXY(16,8);
  WRITE('1. QUIT');
  GOTOXY(16,9);
  WRITE('2. MAKE NEW INFO TABLE');
  GOTOXY(16,10);
  WRITE('3. LIST INFO TABLE');
  GOTOXY(16,11);
  WRITE('4. VERIFY INFO TABLE');
  GOTOXY(16,12);
  WRITE('5. MODIFY INFO TABLE');
  GOTOXY(16,13);
  WRITE('6. FIND ITEMS IN TABLE');
  GOTOXY(16,14);
  WRITE('7. ANALYZE INFO TABLE ROWS');
  GOTOXY(16,17);

```

```

        WRITE('Enter Choice # : ');
        END; (* Infomenu *)

(* ..... *)

BEGIN (* Infosetup *)
    REPEAT
        ESCPROC := FALSE;
        OTHERINFO := FALSE;
        INFOMENU;
        COMMAND := GETCHAR(['1'..'7','L'],TRUE,FALSE,TRUE);

        CASE COMMAND OF
            '1' : ;
            '2' : NEWINFO;
            '3' : LISTINFO;
            '4' : VERIFY;
            '5' : MODIFYINFO;
            '6' : FINDINFO;
            '7' : ANALYZE;
            'L' : BEGIN (1)
                    OTHERINFO := TRUE;
                    LISTINFO;
                END; (1)
        END; (* cases *)
    UNTIL COMMAND = '1';
END; (* Infosetup *)

(* ..... *)

(* main program *)
BEGIN
    DIGITS := ['0'..'9'];
    LETTERS := ['A'..'Z','a'..'z'];
    CHARACTERS := [CHR(32)..CHR(126)];
    FILLCHAR(LINEBUF(0),MAXLINEBUF,' ');
    GETDIRINFO;

    REPEAT
        ESCPROC := FALSE;
        MENU;
        COMMAND := GETCHAR(['1'..'4'],TRUE,FALSE,TRUE);
        CASE COMMAND OF
            '1' : ;
            '2' : INFOSETUP;
            '3' : ;
            '4' : ;
        END; (* cases *)
    UNTIL COMMAND = '1';

    PAGE(OUTPUT);
    GOTOXY(15,18);
    WRITE('Loading Catproject driver');
    SETCHAIN('CATDATA:CATPROJECT');
END. (* Strategy *)

```

```

(*****)
(*)
(*)      Textfile : SMGR.DIR/S.UTL.TEXT          Volume : TFILES
(*)      Codefile : S.MGR.CODE ('Include' file)   Volume : CATDATA
(*)
(*****)
(*)      DEC. 15, 1982                          NPRDC
(*****)

(* This file contains the utility procedures used in S.MGR *)

(* form feeds the printer *)
PROCEDURE TOPOFFFORM;
BEGIN
  REWRITE(DEST,UNITNUMPRINTER);
  WRITE(DEST,CHR(12));
  CLOSE(DEST,LOCK);
END; (* top of form *)

(* ----- *)

(**** rings the bell ****)
PROCEDURE SQUAWK;
BEGIN
  WRITE(CHR(BELL));
END; (* squawk *)

(* ----- *)

(**** blank out lines ****)
PROCEDURE BLANKLINES(START,COUNT,ENDCURSOR : INTEGER);
VAR I : INTEGER;
BEGIN
  GOTOXY(0,START);
  FOR I := 1 TO (COUNT-1) DO
    Writeln(' ' : 39);
    WRITE(' ':39);
    GOTOXY(0,ENDCURSOR);
  END; (* blanklines *)

(* ----- *)

(* read an acceptable character from the keyboard *)
FUNCTION GETCHAR(OKSET : SETOFCHAR;
                 FLUSHQUEUE,ECHO,BEEP : BOOLEAN) : CHAR;
VAR MASK : PACKED ARRAY[0..0] OF CHAR;
BEGIN
  IF FLUSHQUEUE THEN UNITCLEAR(2); (* flush buffer *)
  REPEAT
    UNITREAD(2,MASK,1);
    IF BEEP AND NOT (MASK[0] IN OKSET) THEN SQUAWK;

    UNTIL MASK[0] IN OKSET;
    IF ECHO AND (MASK[0] IN [CHR(32)..CHR(126)]) THEN
      WRITE(MASK[0]);
    GETCHAR := MASK[0];
  END; (* getchar *)

(* ----- *)

(**** display a message/wait for a keystroke ****)
PROCEDURE STALL;
VAR STALLCHAR : CHAR;
BEGIN
  WRITE('Press <RET> to continue ');
  STALLCHAR :=
    GETCHAR([CHR(RET),CHR(ESC)],TRUE,FALSE,TRUE);
  IF STALLCHAR = CHR(ESC) THEN EXIT(PROGRAM);
END; (* stall *)

(* ----- *)

```

```

(* read in a string and save in a temporary buffer *)
PROCEDURE FILLBUF(CHARCNT : INTEGER;
                  OKSET : SETOFCHAR; ERASE : BOOLEAN);
VAR I : INTEGER;
    IOCHAR : CHAR;
BEGIN
    I := 0;
    REPEAT
        IF I > (CHARCNT-1) THEN
            IOCHAR := GETCHAR([CHR(LARROW),CHR(RET)],TRUE,TRUE,TRUE)
        ELSE
            BEGIN (1)
                IOCHAR := GETCHAR(OKSET + [CHR(RET), CHR(LARROW), CHR(RARROW)],
                                TRUE, TRUE, TRUE);
                IF IOCHAR IN OKSET THEN
                    BEGIN (2)
                        LINEBUF[I] := IOCHAR;
                        I := I + 1;
                    END; (2)
                END; (1)
                IF IOCHAR = CHR(LARROW) THEN
                    BEGIN (3)
                        IF I = 0 THEN
                            SQUAWK
                        ELSE
                            BEGIN (4)
                                WRITE(CHR(LARROW));
                                I := I - 1;
                                IF ERASE THEN
                                    BEGIN (5)
                                        WRITE(' ');
                                        WRITE(CHR(LARROW));
                                        LINEBUF[I] := ' ';
                                    END; (5)
                                END; (4)
                            END; (3)
                        ELSE
                            IF IOCHAR = CHR(RARROW) THEN
                                BEGIN (6)
                                    WRITE(LINEBUF[I]);
                                    I := I + 1;
                                END; (6)
                            UNTIL IOCHAR = CHR(RET);
                        END; (* fillbuf *)
                    END;
                (* ----- *)
            (* open a new text file *)
            PROCEDURE GETNEWFILE;
            VAR FILENAME : STRING;
                ERRNUM : INTEGER;

            (* ..... *)

            (* get a legal filename *)
            FUNCTION NAMEOK : BOOLEAN;
            VAR I : INTEGER;
            BEGIN
                IF FILENAME = '' THEN
                    BEGIN (1)
                        FILENAME := DEFAULTFILE;
                        GOTOXY(44,0);
                        WRITE(FILENAME);
                    END; (1)
                ELSE
                    IF FILENAME[I] = CHR(esc) THEN EXIT(PROGRAM);
                    IF (POS('.TEXT',FILENAME) <> (LENGTH(FILENAME) - 4))
                        OR (LENGTH(FILENAME) < 6) THEN
                        FILENAME := CONCAT(FILENAME, '.TEXT');
                (*!-*)
                RESET(DEST,FILENAME);
                (*!+*)
                IF IORESULT = 0 THEN

```

```

BEGIN (2)
  WRITELN;
  WRITELN;
  WRITE('Destroy old ',FILENAME,'? Press ''N'' or ''Y'' ');
  IF GETCHAR(['y','n','Y','N'],TRUE,TRUE,TRUE) IN ['Y','y'] THEN
    BEGIN (3)
      CLOSE(DEST,PURGE);
      REWRITE(DEST,FILENAME);
      NAMEOK := TRUE;
    END (3)
  ELSE
    NAMEOK := FALSE;
END (2)
ELSE
  BEGIN (4)
    (*!-*)
    REWRITE(DEST,FILENAME);
    (*!+*)
    ERRNUM := IORESULT;
    IF IORESULT <> 0 THEN
      BEGIN (5)
        WRITELN;
        WRITELN;
        WRITELN('Cannot open ',FILENAME,' Io error #',ERRNUM);
        NAMEOK := FALSE;
      END (5)
    ELSE
      NAMEOK := TRUE;
  END; (4)
END; (* nameok *)

(* ..... *)

BEGIN (* getnewfile *)
  REPEAT
    PAGE(OUTPUT);
    WRITE('Enter output file name, then press <RET> : ');
    READLN(FILENAME);
  UNTIL NAMEOK;
END;

(* ----- *)

(* send control characters to screen *)
PROCEDURE SCRCONTROL(I,J,K : INTEGER); { PASCAL interface to Screen Control}
VAR N: INTEGER; { APPLE III Standard Device Drivers}
    G_ARRAY: PACKED ARRAY[0.. 3] OF 0..255; {..... Pages 34 to 46.}
BEGIN
  G_ARRAY[0] := I; G_ARRAY[1] := J; G_ARRAY[2] := K;
  UNITWRITE(1,G_ARRAY,3,,12);
END; (* scrcontrol *)

(* ----- *)

(* switch to 40 column screen *)
PROCEDURE TEXT40MODE;
BEGIN
  SCRCONTROL(16,0,28); {Text mode 40BW, followed by clearsreen.}
END; (* text40mode *)

(* ----- *)

(* switch to 80 column screen *)
PROCEDURE TEXT80MODE;
BEGIN
  SCRCONTROL(04,0,0); {Restore Viewport to its original condition.}
  SCRCONTROL(16,2,28); {Text Mode 80, followed by clearsreen.}
END; (* text80mode *)

(* ----- *)

(* turn on reverse video *)
PROCEDURE INVERSE;

```

```
BEGIN
  SCRCONTROL (18,0,0);
END;      (* inverse *)
```

```
(* ----- *)
```

```
(* switch back to normal screen *)
PROCEDURE NORMAL;
BEGIN
  SCRCONTROL (17,0,0);
END;
```

```

(*-----*)
(*)
(*)      Textfile : SMGR.DIR/S.NEW.TEXT      Volume : TFILES      (*)
(*)      Codefile : S.MGR.CODE ('Include' file) Volume : CATDATA (*)
(*)
(*-----*)
(*) File last modified : Feb 23, 1983      NPRODC (*)
(*-----*)
(*)
(*) This procedure allows user to make a new infotable for a subtest already (*)
(*) in the database. Three options are given: (*)
(*) 1. Calculate the info values for a single ability level. This option will (*)
(*) calculate and print out either to the screen or the printer all info (*)
(*) values for any selected Theta using the a,b, & c parameters already in (*)
(*) the database. (*)
(*) 2. Read info table from a textfile. For this option, the textfile must (*)
(*) contain only integers. The program reads an integer and fills up the (*)
(*) infotable by filling in all the columns in a row first, then going on (*)
(*) to the next row. It will tell you if the text file contained the wrong (*)
(*) amount of numbers to fill the infotable. (*)
(*) 3. Calculate the infotable automatically. This option will read the a,b, (*)
(*) & c parameters from the database for any given test, and calculate the (*)
(*) entire set of info values for each T value. Then those values are (*)
(*) sorted and the items with the largest info values are placed into the (*)
(*) row in the infotable for that T. (*)
(*)
(*-----*)

```

(\* accepts keyboard input to fill in table \*)

PROCEDURE NEWINFO;

```

VAR EXTRA,
    UNDER,
    X,Y,
    TABVALUE : INTEGER;
    DONE : BOOLEAN;

```

(\* ..... \*)

(\* This procedure opens a new text file \*)

(\* This procedure is called from: Procedure Infotextfile \*)

PROCEDURE GETINPUTFILE;

```

VAR FILENAME : STRING;
    ERRNUM : INTEGER;
    NAMEOK : BOOLEAN;
BEGIN
    NAMEOK := FALSE;
    REPEAT
        WRITE('Enter input filename, then press <RET> : ');
        READLN(FILENAME);
        WRITELN;
        IF FILENAME[1] = CHR(esc) THEN EXIT(PROGRAM);
        IF (POS('.',TEXT',FILENAME) <> (LENGTH(FILENAME) - 4))
            OR (LENGTH(FILENAME) < 6) THEN
            FILENAME := CONCAT(FILENAME',.TEXT');
    (*!-*)
        RESET(DEST,FILENAME);
    (*!+*)
        IF IORESULT = 0 THEN
            NAMEOK := TRUE
        ELSE
            BEGIN
                ERRNUM := IORESULT;
                WRITELN('IO error #',ERRNUM);
                WRITELN;
            END;
    UNTIL NAMEOK;
END; (* getinputfile *)

```

(\* ----- \*)

(\* This procedure reads an infotable from a textfile and checks to \*)

(\* see that it has the correct number of data in it. \*)

(\* This procedure is called from: Procedure Newinfo. \*)

```

PROCEDURE INFOTEXTFILE;
BEGIN
  GETINPUTFILE;
  X := 1;
  Y := 1;
  EXTRA := 0;
  DONE := FALSE;
  PAGE(OUTPUT);
  WRITE('Loading .');
  WHILE NOT EOF(DEST) DO
    BEGIN (*1*)
      WHILE NOT EOLN(DEST) DO
        BEGIN (*2*)
          READ(DEST, TABVALUE);
          IF NOT DONE
            THEN INFOTABLE(X, Y) := TABVALUE
            ELSE EXTRA := EXTRA + 1;
          X := X + 1;
          IF X > INFOCOLUMNS
            THEN BEGIN (*3*)
              WRITE('.');
              Y := Y + 1;
              X := 1;
              IF Y > INFOROW THEN DONE := TRUE;
            END; (*3*)
          END; (*2*)
        READLN(DEST);
      END; (*1*)
    WRITELN;
    IF (Y = (INFOROW + 1)) AND (X = 1) AND (EXTRA = 0)
      THEN WRITELN('Info table loaded. No errors.')
      ELSE IF EXTRA > 0
        THEN BEGIN (*4*)
          WRITE('Info table loaded, ',
            EXTRA, ' extra items in input file. ');
          SQUAWK;
        END; (*4*)
        ELSE BEGIN (*5*)
          UNDER :=
            (INFOROW * INFOCOLUMNS) - (((Y-1) * INFOCOLUMNS) + (X-1));
          WRITE('Info table loaded, ',
            UNDER, ' items under. Input not complete');
          SQUAWK;
        END; (*5*)
    CLOSE(DEST, LOCK);
    WRITELN;
    WRITELN;
    STALL;
  END; (* Infotextfile *)

  (* ----- *)

  (* Bounded exponential function *)
  (* This function is called by: Function Info *)
  FUNCTION EXPF( X : REAL ) : REAL;
  CONST XMAX = 29.0;
        XMIN = -87.0;
  VAR Y : REAL;
  BEGIN
    IF X < XMIN
      THEN Y := XMIN
      ELSE IF X > XMAX
        THEN Y := XMAX
        ELSE Y := X;
    EXPF := EXP(Y);
  END; (* Function Expf *)

  (* ----- *)

  (* Calculate info value from A,B,C parameters for this Theta *)
  (* This function is called by: Procedure Optimum *)
  FUNCTION INFO( T, A, B, C : REAL ) : REAL;
  CONST D = 1.7; (* Scaling Factor *)

```

```

VAR DA, TMP, Y, Z, ZC : REAL;
BEGIN
  DA := D * A;
  Y := DA * (B - T);
  Z := EXPF(Y);
  ZC := Z * C;
  TMP := DA * DA * (Z - ZC) / (1.0 + ZC);
  INFO := TMP * (1 / ((1.0 + Z) * (1.0 + Z)));
END; (* Function Info *)

(* ----- *)

(* Quicksort of infovalues puts largest into first array location *)
(* and puts the rest into descending order *)
(* This procedure is called by: Procedure Optimum *)
PROCEDURE SORTINFOVALUES(LEFT, RIGHT : INTEGER);
VAR LPTR, RPTR,      (* Pointers to array locations *)
    TEMPITEM : INTEGER; (* Temporary during exchange *)
    TEMPINFO,      (*      *)
    PARTITION : REAL;  (* Midpoint of array to which left & right
                        values are compared for sorting *)
BEGIN
  LPTR := LEFT;
  RPTR := RIGHT;
  PARTITION := SORTARRAY[(LEFT + RIGHT) DIV 2].INFOVALUE;
  (* Divide array into two sections: those infovalues greater than
     the partition value, and those less than the partition value. *)
  REPEAT
    WHILE SORTARRAY[LPTR].INFOVALUE > PARTITION DO
      LPTR := LPTR + 1;
    WHILE PARTITION > SORTARRAY[RPTR].INFOVALUE DO
      RPTR := RPTR - 1;
    IF LPTR <= RPTR
      THEN BEGIN
        (* Exchange, these are on the wrong sides of partition *)
        TEMPITEM := SORTARRAY[LPTR].ITEM;
        TEMPINFO := SORTARRAY[LPTR].INFOVALUE;
        SORTARRAY[LPTR].ITEM := SORTARRAY[RPTR].ITEM;
        SORTARRAY[LPTR].INFOVALUE := SORTARRAY[RPTR].INFOVALUE;
        SORTARRAY[RPTR].ITEM := TEMPITEM;
        SORTARRAY[RPTR].INFOVALUE := TEMPINFO;
        LPTR := LPTR + 1;
        RPTR := RPTR - 1;
      END;
  UNTIL LPTR > RPTR;
  (* Recursively sort each section that was partitioned *)
  IF LEFT < RPTR
    THEN SORTINFOVALUES(LEFT, RPTR);
  IF LPTR < RIGHT
    THEN SORTINFOVALUES(LPTR, RIGHT);
END; (* Sortinfovalues *)

(* ----- *)

(* This procedure is for debugging only. It prints out the SORTARRAY *)
(* so that it can be reviewed for accuracy. It is for ONE value of T. *)
(* This procedure is called by: Procedure Optimum *)
PROCEDURE OUTPTINFO(K:INTEGER; T:REAL; TITLE, DESTNAME:STRING);
CONST LINESPERPAGE = 66;
VAR J, LINECOUNT : INTEGER;
    DEST : TEXT;
BEGIN
  REWRITE(DEST, DESTNAME);
  IF TITLE = 'UNSORTED'
    THEN BEGIN
      WRITELN(DEST,
        'UNSORTED INFOTABLE FOR ', DIRECTORY.TESTNAME, ' T=', T);
      WRITELN(DEST,
        '-----');
    END
  ELSE BEGIN
    WRITELN(DEST,
      'SORTED INFOTABLE FOR ', DIRECTORY.TESTNAME, ' T=', T);
  END

```

```

        WRITELN(DEST,
        -----');
    END;
    FOR J := 1 TO 4 DO
        WRITE(DEST, '    ITEM INFOVALUE');
        WRITELN(DEST);
        LINECOUNT := 3;
        FOR J := 0 TO K DO
            BEGIN
                IF (J MOD 4) = 0
                THEN BEGIN
                    LINECOUNT := LINECOUNT + 1;
                    WRITELN(DEST);
                END;
                WRITE(DEST, SORTARRAY[J].ITEM, 7, SORTARRAY[J].INFOVALUE, 10, 7);
            END;
        IF DESTNAME = 'PRINTER:'
        THEN FOR J := LINECOUNT TO LINESPERPAGE DO
            WRITELN(DEST);
        WRITELN;
        CLOSE(DEST, LOCK);
    END; (* Outptinfo *)

```

(\* ----- \*)

```

(* Optimize the info -- ie. get valid items and sort by infovalue *)
(* This procedure is called by: Procedure Table *)
PROCEDURE OPTIMUM(T : REAL; ONE : BOOLEAN; DESTNAME : STRING);
VAR I,      (* Loop counter *)
    K,      (* Item counter *)
    MINITEMPOOL : INTEGER;
BEGIN
    MINITEMPOOL := MAXSAMPLES + 1;
    K := 0;
    WRITELN;
    WRITELN('COMPUTING INFOVALUES FOR THETA= ', T);
    FOR I:= MINITEMPOOL TO MAXITEMPOOL DO
        (* Get only valid items, and put into an array with infovalues *)
        IF TESTPARAM[I].ITEM >= 0
        THEN BEGIN
            WRITE(' ');
            SORTARRAY[K].ITEM := TESTPARAM[I].ITEM;
            SORTARRAY[K].INFOVALUE := INFO( T, TESTPARAM[I].A,
            TESTPARAM[I].B,
            TESTPARAM[I].C );
            K := K + 1;
        END;
    WRITELN;
    K := K - 1;
    IF K < INFOCOLUM
    THEN BEGIN
        SQUAWK;
        WRITELN;
        WRITELN('NOT ENOUGH QUESTIONS IN TEST TO MAKE INFOTABLE!!!');
        STALL;
        EXIT(NEWINFO);
    END;
    WRITELN;
    WRITELN('SORTING THE INFOTABLE ');
    SORTINFOVALUES(0, K);
    IF ONE
    THEN OUTPTINFO(K, T, 'SORTED', DESTNAME);
END; (* Optimum *)

```

(\* ----- \*)

```

(* Create infotable *)
(* This procedure is called by: Procedure Newinfo *)
PROCEDURE TABLE;
(* The constants TMIN (Lowest value of ability level) and DT (Increment
value) are global to program S.MGR *)
VAR I, J : INTEGER;      (* Loop counters *)

```

```

    T : REAL;          (* Theta -- ability level *)
BEGIN
    T := TMIN;
    FOR J := 1 TO INFOROW DO      (* number of rows in infotable *)
        BEGIN
            OPTIMUM(T,FALSE,'');
            (* after sorted, put into infotable *)
            FOR I := 1 TO INFOCOLUMN DO
                INFOTABLE[I,J] := SORTARRAY[I-1].ITEM;
            T := T + DT;
        END;
    END; (* Table *)

    (* ----- *)

    (* This allows you to enter from the terminal a single value *)
    (* for T and calculate and print out all infovalues for that T *)
    (* This procedure is called from: Newinfo *)
    PROCEDURE ONETHETA;
    VAR T : REAL;
        MORETHETAS : BOOLEAN;
    BEGIN
        MORETHETAS := TRUE;
        REPEAT
            WRITELN;
            WRITELN('ENTER ABILITY LEVEL (real number between -2.5 and +2.5)');
            WRITE('THETA : ');
            READLN(T);
            WRITELN;WRITELN('WHERE DO YOU WANT THE OUTPUT?');
            WRITELN('  1) SCREEN');
            WRITELN('  2) PRINTER');
            IF GETCHAR(['1','2'],TRUE,FALSE,TRUE) = '1'
                THEN OPTIMUM(T,TRUE,'CONSOLE:');
            ELSE OPTIMUM(T,TRUE,'PRINTER:');
            WRITELN;WRITELN('WANT TO DO ANOTHER ONE?');
            IF GETCHAR(['Y','y','N','n'],TRUE,FALSE,TRUE) IN ['N','n']
                THEN MORETHETAS := FALSE;
        UNTIL NOT MORETHETAS;
    END; (* Onetheta *)

    (* ----- *)

    (* This procedure updates the info table and then branches to the *)
    (* 'Verify' option to update the second info table. *)
    PROCEDURE UPDATE;
    BEGIN
        UPDATEINFOFILE(CURRINDEXRECNUM);
        PAGE(OUTPUT);
        CHECKTAB(CURRINDEXRECNUM);
    END;

    (* ..... *)

    BEGIN (* new info table *)
        LOADTEST('Make new info table for which test? : ');
        IF ESCPROC THEN
            EXIT(NEWINFO);
        PAGE(OUTPUT);
        GOTOXY(15,8);
        WRITE('MAKE INFOTABLE FOR : ',DIRECTORY.TESTNAME);
        GOTOXY(8,4);
        WRITE('Select one of the following options by entering its number. ');
        GOTOXY(12,8);
        WRITE('1. Quit');
        GOTOXY(12,9);
        WRITE('2. Infotable for a single ability level Theta');
        GOTOXY(12,10);
        WRITE('3. Read infotable values from a textfile');
        GOTOXY(12,11);
        WRITE('4. Calculate all infotable values from internal parameters');
        GOTOXY(12,15);
        WRITE('Enter Choice # : ');
        CASE GETCHAR(['1','2','3','4'],TRUE,FALSE,TRUE) OF

```

```
'1': ;
'2': BEGIN
    PAGE(OUTPUT);
    PARAM_ARRAY;
    PAGE(OUTPUT);
    ONETHETA;
    END;
'3': BEGIN
    PAGE(OUTPUT);
    INFOTEXTFILE;
    UPDATE;
    END;
'4': BEGIN
    PAGE(OUTPUT);
    PARAM_ARRAY;
    PAGE(OUTPUT);
    TABLE;
    UPDATE;
    END;
END; (* Cases *)
END; (* new info *)
```

```

(*)
(*)
(*)      Textfile : SMGR.DIR/S.VERF.TEXT      Volume : TFILES      *)
(*)      Codefile : S.MGR.CODE ('Include' file) Volume : CATDATA    *)
(*)
(*)
(*) File last modified : JULY 7, 1983      NPROC      *)
(*)

```

(\* checks the infotable for duplications or missing entries \*)

PROCEDURE CHECKTAB(INFOREC : INTEGER);

```

VAR ERRORCNT,
    DSLOT,
    I,J,K,COUNT,OFFSET: INTEGER;
    LISTERR : BOOLEAN;
    DUPLIC : ARRAY[1..720] OF RECORD
        RW,
        IINDEX,
        KINDEX,
        ITEM:INTEGER;
    END;
    ERRLIST : ARRAY[1..720] OF RECORD
        R,
        C,
        CODE : INTEGER;
    END;

```

BEGIN

```

    PAGE(OUTPUT);
    LOADINFO(INFOREC);
    WRITELN('Verifying ');
    ERRORCNT := 0;
    COUNT:=0;

```

FOR J := 1 TO INFOROW+1 DO

BEGIN

FOR I := 1 TO INFOCOLUMN DO

BEGIN

IF J < INFOROW +1 THEN

BEGIN

WRITE('.');

IF INFOTABLE[I,J] < 0 THEN

DSLOT := -1

ELSE

DSLOT := SLOT(INFOTABLE[I,J]); (\* Transforms question # to pointer \*)

IF DSLOT < 0 THEN

BEGIN

ERRORCNT := ERRORCNT + 1;

WITH ERRLIST[ERRORCNT] DO

BEGIN

R := J;

C := I;

CODE := INFOTABLE[I,J];

END;

END;

INFOTABLE[I,J] := DSLOT;

END;

(\* Checks for duplicate entries in the infotable that are not equal\*;

(\* to -1. The entry and the row location are saved and displayed \*)

(\* later in the routine. The second (pointer)infotable is checked \*)

FOR K:=1 TO 20 DO

BEGIN

IF J > 1 THEN

BEGIN

OFFSET:=J-1;

IF INFOTABLE[I,OFFSET]=INFOTABLE[K,OFFSET] THEN

BEGIN

IF (I > K) AND (INFOTABLE[K,OFFSET] > 0) THEN

BEGIN

COUNT:=COUNT+1;

WITH DUPLIC(COUNT) DO

BEGIN

RW:=OFFSET;

```

ITEM:=INFOTABLE(K,OFFSET);
IINDEX:=I;
KINDEX:=K;
END;
END;
END;
END;
END;
IF J MOD 3 = 0 THEN WRITELN;
END;
WRITELN;
WRITELN;
WRITELN('There are ',ERRORCNT,' errors in the info tables.');
```

WRITELN;

IF ERRORCNT > 0 THEN

BEGIN

WRITE('List the errors? Press ''Y'' or ''N'' : ');

IF GETCHAR(['y','n','Y','N'],true,false,true) IN ['Y','y'] THEN

BEGIN

PAGE(OUTPUT);

FOR I := 1 TO ERRORCNT DO

BEGIN

WITH ERRLIST(I) DO

BEGIN

WRITELN('Error! Infotable entry ',CODE,

' at row ',R,' ,column ',C,' not found in directory.');

END;

IF I MOD 20 = 0 THEN

BEGIN

WRITELN;

STALL;

WRITELN;

WRITELN;

END;

END;

END;

ELSE

WRITELN;

END;

IF COUNT > 0 THEN

BEGIN

WRITELN('DUPLICATION ERRORS EXIST IN THE SUBTEST INFOTABLE');

WRITELN;

FOR K:=1 TO COUNT DO

BEGIN

WITH DUPLIC(K) DO

WRITELN('ITEM ',ITEM,' DUPLICATED IN ROW ',RW,' COLUMNS ',IINDEX,' ',KINDEX);

END;

END;

STALL;

UPDATEINFO(INFOREC + MAXSUBTESTS + 1);

END; (\* checktab \*)

```

(* This procedure stores the index of the directory of the question rather *)
(* than the question code. This will cut down search time for item in direc- *)
(* tory when referencing infotable. It is also a verification that all items *)
(* in the info table are also in the subtest directories. *)
(* This procedure is called from : Procedure Infosetup *)
```

```

PROCEDURE VERIFY;
BEGIN
  LOADTEST('Verify infotable for which subtest? : ');
  IF ESCPROC THEN
    EXIT(VERIFY);
  CHECKTAB(CURRINDEXRECNUM);
END; (* Verify *)
```

```
(******)
(*)
(*)      Textfile : SMGR.DIR/S.MODF.TEXT      Volume : TFILES      (*)
(*)      Codefile : S.MGR.TEXT ('Include' file) Volume : CATDATA      (*)
(*)
(*)******)
(*) File last modified : Feb 23, 1983      NPROC      (*)
(*)******)
```

(\* allows modifications to information table \*)

```
PROCEDURE MODIFYINFO;
VAR X,Y,
    TABVALUE : INTEGER;
    MODCHAR : CHAR;
```

(\* ..... \*)

```
BEGIN (* modify info *)
  LOADTEST('Modify infotable for which test? ');
  IF ESCPROC THEN
    EXIT(MODIFYINFO);
  LOADINFO(CURRINDEXRECNUM);
  FORMATSREEN;
  GOTOXY(0,0);
  WRITE('Test : ',DIRECTORY.TESTNAME);
  Y := 1;
  X := 1;
  GOTOXY(50,2);
  WRITE('INSTRUCTIONS');
  GOTOXY(47,4);
  WRITE('Use ---> and <-- to move');
  GOTOXY(47,5);
  WRITE('horizontally in infotable');
  GOTOXY(47,7);
  WRITE('Use <up arrow> and ');
  GOTOXY(47,8);
  WRITE('<down arrow> to move');
  GOTOXY(47,9);
  WRITE('vertically in infotable. ');
  GOTOXY(47,11);
  WRITE('To change a value in the ');
  GOTOXY(47,12);
  WRITE('table, go to the location');
  GOTOXY(47,13);
  WRITE('you wish to change, Press "M". ');
  GOTOXY(47,14);
  WRITE('enter the new value, then');
  GOTOXY(47,15);
  WRITE('press <RET>. ');
  GOTOXY(47,17);
  WRITE('Press <ESC> to quit without');
  GOTOXY(47,18);
  WRITE('updating. ');
  GOTOXY(47,20);
  WRITE('Press <CNTRL-C> to quit and');
  GOTOXY(47,21);
  WRITE('update');
  REPEAT
    GOTOXY(6,5);
    WRITE(Y, ' ');
    GOTOXY(9,7);
    WRITE(X, ' ');
    GOTOXY(10,9);
    WRITE(' ');
    GOTOXY(10,9);
    WRITE(INFOTABLE(X,Y));
    GOTOXY(X+17,(((Y-1) DIV 2) + 3));
    MODCHAR := GETCHAR((CHR(LARROW),CHR(RARROW),CHR(UP),CHR(DOWN),
      CHR(ESC),CHR(ETX),'M','m'),TRUE,FALSE,TRUE);
    CASE ORD(MODCHAR) OF
      LARROW : IF X = 1 THEN
        BEGIN
```

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MICROCOMPUTER NETWORK FOR COMPUTERIZED ADAPTIVE TESTING 4/5

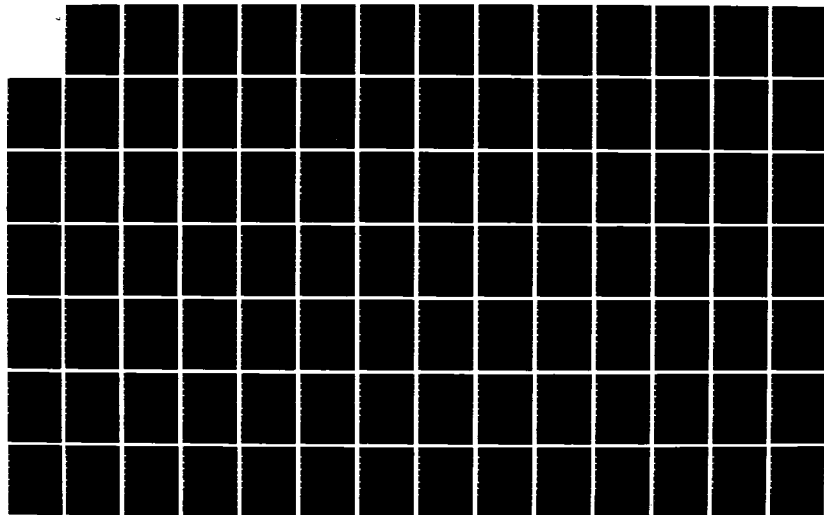
(CAT): PROGRAM LI. (U) NAVY PERSONNEL RESEARCH AND  
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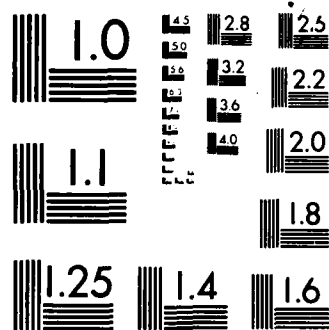
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NL





MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS 1963-A

```

        IF Y > 1 THEN
        BEGIN
            Y := Y - 1;
            X := INFOCOLUMN;
        END
        ELSE
            SQUAWK;
    END
    ELSE
        X := X - 1;

    RARROW : IF X = INFOCOLUMN THEN
    BEGIN
        IF Y < INFOROW THEN
        BEGIN
            Y := Y + 1;
            X := 1;
        END
        ELSE
            SQUAWK;
    END
    ELSE
        X := X + 1;

    UP      : IF Y = 1 THEN
        SQUAWK
    ELSE
        Y := Y - 1;

    DOWN    : IF Y = INFOROW THEN
        SQUAWK
    ELSE
        Y := Y + 1;

    ESC     : EXIT(MODIFYINFO);

    ETX     : ;

END; (* case *)
IF MODCHAR IN ('M','m') THEN
BEGIN
    GOTOXY(10,9);
    WRITE(' ');
    GOTOXY(10,9);
    READLN(TABVALUE);
    INFOTABLE (X,Y) := TABVALUE;
END;
UNTIL ORD(MODCHAR) = ETX;
UPDATEINFOFILE (CURRINDEXRECNUM);
CHECKTAB (CURRINDEXRECNUM);
END; (* modify info *)

```

```

(*)
(*)
(*)   Textfile : SMGR.DIR/S.LIST.TEXT           Volume : TFILES           (*)
(*)   Codefile : S.MGR.CODE ('Include' file)    Volume : CATDATA          (*)
(*)
(*)
(*)   DEC. 14, 1982                             NPROC                      (*)
(*)

```

(\* lists the information table to file or printer \*)

PROCEDURE LISTINFO;

VAR I,J : INTEGER;

PRINTER,

TOFILE : BOOLEAN;

SELECT : CHAR;

(\* ..... \*)

PROCEDURE LISTPRINTER;

BEGIN

PAGE(OUTPUT);

WRITE('Writing .');

Writeln(DEST,'Test : ',DIRECTORY.TESTNAME);

Writeln(DEST);

J := 1;

WRITE(DEST,' ');

FOR I := 1 TO 10 DO WRITE(DEST,I : 7);

Writeln(DEST);

Writeln(DEST,

');

REPEAT

WRITE('.');

WRITE(DEST,J:2,'| ');

FOR I := 1 TO 10 DO

WRITE(DEST,INFOTABLE[I,J] : 7);

Writeln(DEST);

J := J + 1;

UNTIL J > INFOROW;

Writeln(DEST);

Writeln(DEST);

Writeln(DEST);

Writeln(DEST);

J := 1;

WRITE(DEST,' ');

FOR I := 11 TO INFOCOLUMN DO WRITE(DEST,I : 7);

Writeln(DEST);

Writeln(DEST,

');

REPEAT

WRITE('.');

WRITE(DEST,J:2,'| ');

FOR I := 11 TO INFOCOLUMN DO

WRITE(DEST,INFOTABLE[I,J] : 7);

Writeln(DEST);

J := J + 1;

UNTIL J > INFOROW;

Writeln(DEST);

CLOSE(DEST,LOCK);

END; (\* listprinter \*)

(\* ..... \*)

(\* list to console \*)

PROCEDURE LISTCONSOLE;

(\* ..... \*)

PROCEDURE L1;

BEGIN

PAGE(OUTPUT);

Writeln('Test : ',DIRECTORY.TESTNAME);

Writeln;

WRITE(' ');

```

        FOR I := 1 TO 10 DO WRITE(I : 7);
        WRITELN;
        WRITELN(
            _____');
        FOR J := 1 TO 18 DO
        BEGIN
            WRITE(J:2,'| ');
            FOR I := 1 TO 10 DO
                WRITE(INFOTABLE(I,J) : 7);
            WRITELN;
        END;
        GOTOXY(0,23);
        STALL;
    END; (* L1 *)

    (* ----- *)

    PROCEDURE L2;
    BEGIN
        PAGE(OUTPUT);
        WRITELN('Test : ',DIRECTORY.TESTNAME);
        WRITELN;
        WRITE(' ');
        FOR I := 1 TO 10 DO WRITE(I : 7);
        WRITELN;
        WRITELN(
            _____');
        FOR J := 19 TO 36 DO
        BEGIN
            WRITE(J:2,'| ');
            FOR I := 1 TO 10 DO
                WRITE(INFOTABLE(I,J) : 7);
            WRITELN;
        END;
        GOTOXY(0,23);
        STALL;
    END; (* L2 *)

    (* ..... *)

    BEGIN (* listconsole *)
        L1;
        L2;
        PAGE(OUTPUT);
        WRITELN('Test : ',DIRECTORY.TESTNAME);
        WRITELN;
        WRITE(' ');
        FOR I := 11 TO INFOCOLUMN DO WRITE(I : 7);
        WRITELN;
        WRITELN(
            _____');
        FOR J := 1 TO 18 DO
        BEGIN
            WRITE(J:2,'| ');
            FOR I := 11 TO INFOCOLUMN DO
                WRITE(INFOTABLE(I,J) : 7);
            WRITELN;
        END;
        GOTOXY(0,23);
        STALL;
        PAGE(OUTPUT);
        WRITELN('Test : ',DIRECTORY.TESTNAME);
        WRITELN;
        WRITE(' ');
        FOR I := 11 TO INFOCOLUMN DO WRITE(I : 7);
        WRITELN;
        WRITELN(
            _____');
        FOR J := 19 TO 36 DO
        BEGIN
            WRITE(J:2,'| ');
            FOR I := 11 TO INFOCOLUMN DO
                WRITE(INFOTABLE(I,J) : 7);

```

```

        WRITELN;
      END;
      GOTOXY(0,23);
      STALL;
    END; (* listconsole *)

```

```
(* ..... *)
```

```
(* writes info tables to individual files for floppy version of test *)
(* administration. Keeps format same. *)
```

```
PROCEDURE WRITETOFILE;
```

```
VAR FILENAME : STRING;
```

```
    SMALLINFO : FILE OF TABLE;
```

```
BEGIN
```

```
  PAGE(OUTPUT);
```

```
  WRITE('Enter two character code for subtest, then press <RET> : ');
```

```
  READLN(FILENAME);
```

```
  IF FILENAME = '' THEN
```

```
    EXIT(WRITETOFILE)
```

```
  ELSE
```

```
    IF FILENAME[1] = CHR(esc) THEN
```

```
      EXIT(WRITETOFILE);
```

```
    FILENAME := CONCAT(FILENAME, '.INFO.DATA');
```

```
    REWRITE(SMALLINFO, FILENAME);
```

```
    LOADINFO(CURRINDEXRECNUM);
```

```
    SMALLINFO^ := INFOTABLE;
```

```
    SEEK(SMALLINFO, 0);
```

```
    PUT(SMALLINFO);
```

```
    LOADINFO(CURRINDEXRECNUM + MAXSUBTESTS + 1);
```

```
    SMALLINFO^ := INFOTABLE;
```

```
    SEEK(SMALLINFO, 1);
```

```
    PUT(SMALLINFO);
```

```
    CLOSE(SMALLINFO, LOCK);
```

```
  END; (* write to file *)
```

```
BEGIN (* Listinfo *)
```

```
  PAGE(OUTPUT);
```

```
  GOTOXY(20, 0);
```

```
  WRITE('SELECT OUTPUT MENU');
```

```
  GOTOXY(0, 4);
```

```
  WRITE('Select one of the following options by entering its number.');
```

```
  GOTOXY(16, 8);
```

```
  WRITE('1. QUIT');
```

```
  GOTOXY(16, 9);
```

```
  WRITE('2. LIST INFOTABLE TO SCREEN');
```

```
  GOTOXY(16, 10);
```

```
  WRITE('3. LIST INFOTABLE TO PRINTER');
```

```
  GOTOXY(16, 11);
```

```
  WRITE('4. LIST INFOTABLE TO FLOPPY DATA FILE');
```

```
  GOTOXY(16, 12);
```

```
  WRITE('5. LIST INFOTABLE TO TEXT FILE');
```

```
  GOTOXY(16, 14);
```

```
  WRITE('Enter choice # : ');
```

```
  PRINTER := FALSE;
```

```
  TOFILE := FALSE;
```

```
  SELECT := GETCHAR(['1'..'5'], TRUE, FALSE, TRUE);
```

```
  CASE SELECT OF
```

```
    '1' : EXIT(LISTINFO);
```

```
    '2' : ;
```

```
    '3' : BEGIN
```

```
      PRINTER := TRUE;
```

```
      REWRITE(DEST, 'PRINTER:');
```

```
    END;
```

```
    '4' : TOFILE := TRUE;
```

```
    '5' : BEGIN
```

```
      GETNEWFILE;
```

```
      PRINTER := TRUE;
```

```
END;  
END;  
LOADTEST('List infotable for which subtest? : ');  
IF ESCPROC THEN  
  EXIT(LISTINFO);  
  
IF TOFILE THEN  
  BEGIN  
    WRITETOFILE;  
    EXIT(LISTINFO);  
  END;  
  
IF OTHERINFO THEN  
  LOADINFO(CURRINDEXRECNUM + MAXSUBTESTS + 1)  
ELSE  
  LOADINFO(CURRINDEXRECNUM);  
  IF PRINTER THEN  
    LISTPRINTER  
  ELSE  
    LISTCONSOLE;  
END; (* list info *)
```

```

(*-----*)
(*      Textfile : SMGR.DIR/S.FIND.TEXT      Volume : TFILES      *)
(*      Codefile : S.MGR.CODE ('Include' file) Volume : CATDATA    *)
(*-----*)
(*      DEC. 14, 1982      NPRODC      *)
(*-----*)

```

```

(* This procedure allows you to examine automatically the infotable for *)
(* a specific item to see if it is ever called. Or, it will print out *)
(* all of the items that are never called. *)
(* This procedure is called by: Procedure *)
PROCEDURE FINDINFO;

```

```

(* ..... *)

```

```

PROCEDURE FINDMENU;
BEGIN
  PAGE(OUTPUT);
  GOTOXY(20,0);
  WRITE('menu');
  GOTOXY(0,4);
  WRITE('Select one of the following options by entering its number:');
  GOTOXY(14,8);
  WRITE('1. QUIT');
  GOTOXY(14,9);
  WRITE('2. Find a single item in infotable');
  GOTOXY(14,10);
  WRITE('3. List to screen all occurrences of an item');
  GOTOXY(14,11);
  WRITE('4. List to printer all occurrences of an item');
  GOTOXY(14,12);
  WRITE('5. List to screen all items not used');
  GOTOXY(14,13);
  WRITE('6. List to printer all items not used');
  GOTOXY(14,17);
  WRITE('Enter Choice # : ');
END; (* Findmenu *)

```

```

(* ----- *)

```

```

(* This procedure will find a single item if it is in the infotable. *)
(* This procedure is called from: Procedure Findinfo *)

```

```

PROCEDURE FINDITEM(DESTNAME:STRING);
VAR N,X,Y,ITEMNUM : INTEGER;
    MOREITEMS,FOUND : BOOLEAN;
    DEST : TEXT;

```

```

(* ..... *)

```

```

PROCEDURE ITEMFOUND(VAR N,X,Y : INTEGER; DESTNAME : STRING);
BEGIN
  IF DESTNAME = 'NOWHERE'
  THEN BEGIN (*1*)
    WRITELN;
    WRITELN('ITEM : ',ITEMNUM,' ',
            'ROW : ',X,' ', 'COLUMN : ',Y);
    WRITELN;WRITELN('Do you want the next location?');
    IF GETCHAR(['Y','N','y','n'],TRUE,FALSE,TRUE)
    IN ['N','n'] THEN BEGIN (*2*)
      X := INFOROW;
      Y := INFOCOLUMN;
    END; (*2*)
  END (*1*)
  ELSE BEGIN (*3*)
    IF (N MOD 6) = 0
    THEN WRITELN(DEST);
    N := N+1;
    WRITE(DEST,X:3,Y:4,' ');
  END; (*3*)
END; (* Itemfound *)

```

```
(* ..... *)
```

```
BEGIN (* Finditem *)
  REPEAT
    PAGE(OUTPUT);
    WRITE('Item number you wish to find : ');
    READLN(ITEMNUM);
    WRITELN;
    IF NOT (DESTNAME = 'NOWHERE')
      THEN BEGIN
        REWRITE(DEST, DESTNAME);
        WRITELN(DEST); WRITELN(DEST); WRITELN(DEST);
        WRITELN(DEST, 'SUBTEST : ', DIRECTORY.TESTNAME);
        WRITELN(DEST, 'Locations in infotable of item : ', ITEMNUM);
        WRITELN(DEST);
        FOR N := 1 TO 6 DO
          WRITE(DEST, 'ROW', ' COL      ');
          N := 0;
        END;
        Y := 1;
        WHILE Y <= INFOCOLUMNS DO
          BEGIN (*1*)
            X := 1;
            WHILE X <= INFOROWS DO
              BEGIN (*2*)
                IF ITEMNUM = INFOTABLE[Y,X]
                  THEN BEGIN (*3*)
                    FOUND := TRUE;
                    ITEMFOUND(N,X,Y,DESTNAME);
                    END (*3*)
                  ELSE FOUND := FALSE;
                    X := X+1;
                  END; (*2*)
                Y := Y+1;
              END; (*1*)
            IF NOT (DESTNAME = 'NOWHERE')
              THEN BEGIN
                WRITELN(DEST);
                CLOSE(DEST, NORMAL);
                END;
            IF NOT FOUND THEN WRITELN('No more locations of item ', ITEMNUM);
            WRITELN('Do you want to find a different item?');
            IF GETCHAR(['Y','y','N','n'], TRUE, FALSE, TRUE) IN ['Y','y']
              THEN MOREITEMS := TRUE
              ELSE MOREITEMS := FALSE;
            UNTIL NOT MOREITEMS;
          END; (* Finditem *)
```

```
(* ----- *)
```

```
PROCEDURE FINDUNUSED(DESTNAME : STRING);
(* The constants MAXITEMPOOL and MAXSAMPLES are global to Program Strategy. *)
TYPE ARRAYTYPE = PACKED ARRAY[0..MAXITEMPOOL] OF INTEGER;
VAR I,J,K,NUMITEMS,MINITEMPOOL : INTEGER;
    NOTFOUND : ARRAYTYPE;
    SORTARRAY : ARRAYTYPE;
    FOUNDARRAY : ARRAYTYPE;
    DEST : TEXT;
```

```
(* ..... *)
```

```
(* This procedure does a quicksort of the SORTARRAY which contains *)
(* the valid item numbers for this subtest. The array was filled *)
(* in Procedure GETITEMS. It is a recursive procedure. *)
(* This procedure is called by: Procedure Getitems. *)
PROCEDURE SORTITEMS(LEFT, RIGHT : INTEGER);
VAR LPTR, RPTR, (* Pointers to array locations *)
    TEMP : INTEGER; (* Temporary during exchange *)
    PARTITION : REAL; (* Midpoint of array to which left & right
                        values are compared for sorting *)
```

```
BEGIN
```

```

LPTR := LEFT;
RPTR := RIGHT;
PARTITION := SORTARRAY( (LEFT + RIGHT) DIV 2 );
(* Divide array into two sections: those item numbers greater than
the partition value, and those less than the partition value. *)
REPEAT
  WHILE SORTARRAY(LPTR) < PARTITION DO
    LPTR := LPTR + 1;
  WHILE PARTITION < SORTARRAY(RPTR) DO
    RPTR := RPTR - 1;
  IF LPTR <= RPTR
    THEN BEGIN
      (* Exchange, these are on the wrong sides of partition *)
      TEMP := SORTARRAY(LPTR);
      SORTARRAY(LPTR) := SORTARRAY(RPTR);
      SORTARRAY(RPTR) := TEMP;
      LPTR := LPTR + 1;
      RPTR := RPTR - 1;
    END;
  UNTIL LPTR > RPTR;
(* Recursively sort each section that was partitioned *)
IF LEFT < RPTR
  THEN SORTITEMS(LEFT,RPTR);
IF LPTR < RIGHT
  THEN SORTITEMS(LPTR,RIGHT);
END; (* Sortitems *)

(* ----- *)

(* This procedure gets the item numbers from the file. They are in *)
(* the file's window variable DIRECTORY (global to Program STRATEGY) *)
(* which was initialized in Procedure LOADTEST. Since items in that *)
(* file of value -1 indicate a blank record, only the items greater *)
(* than -1 are loaded into an array to be sorted. *)
(* This procedure is called by: Procedure FINDUNUSED. *)
PROCEDURE GETITEMS(VAR NUMITEMS : INTEGER);
VAR I,MINITEMPOOL : INTEGER;
BEGIN
  PAGE(OUTPUT); (* Utility procedure in file: T-UTL.TEXT *)
  WRITELN('Getting the items from file');
  MINITEMPOOL := MAXSAMPLES + 1;
  NUMITEMS := 0;
  FOR I := MINITEMPOOL TO MAXITEMPOOL DO
    IF DIRECTORY.ITEMCODE(I) >= 0
      THEN BEGIN (* *)
        SORTARRAY(NUMITEMS) := DIRECTORY.ITEMCODE(I);
        NUMITEMS := NUMITEMS + 1;
      END; (* *)
  WRITELN('Number of items in file : ',NUMITEMS);
  WRITELN;
  IF NUMITEMS > 0
    THEN NUMITEMS := NUMITEMS - 1
  ELSE BEGIN
    WRITELN(DEST);
    WRITELN(DEST,'There are no items in ',DIRECTORY.TESTNAME);
    EXIT(FINDUNUSED);
  END;
  IF NUMITEMS > 0 THEN begin
    WRITELN('Sorting items...');
    SORTITEMS(0,NUMITEMS);
  end;
END; (* Getitems *)

(* ----- *)

FUNCTION INTABLE(ITEM : INTEGER) : BOOLEAN;
(* The constants INFOROW and INFOCOLUMN are defined in Procedure *)
(* INFOSETUP. *)
VAR ROW,COL : INTEGER;
    FOUND : BOOLEAN;
BEGIN
  ROW := 1;
  FOUND := FALSE;

```

```

REPEAT
  COL := 1;
  REPEAT
    IF ITEM = INFOTABLE[COL,ROW]
      THEN FOUND := TRUE
      ELSE COL := COL + 1;
    UNTIL FOUND OR (COL > INFOCOLUMN);
    ROW := ROW + 1;
  UNTIL FOUND OR (ROW > INFOROW);
  INTABLE := FOUND;
END; (* Intable *)

```

```
(* ..... *)
```

```

BEGIN (* Findunused *)
  PAGE(OUTPUT);
  REWRITE(DEST,DESTNAME);
  GETITEMS(NUMITEMS);      (* Count the items as you get & sort them *)
  J := 0; K := 0;
  LOADINFO(CURRINDEXRECNUM); (* Loads the infotable from the file into *)
  (* the array variable INFOTABLE as defined in Procedure INFOSETUP *)
  WRITELN;
  WRITELN('Be patient, I have to compare each of these ',NUMITEMS + 1,
    ' items to the infotable. ');
  FOR I := 0 TO NUMITEMS DO
    IF INTABLE(SORTARRAY[I])
      THEN BEGIN (* Put items found in infotable into one array *)
        WRITE('. ');
        FOUNDARRAY[J] := SORTARRAY[I];
        J := J + 1;
      END
      ELSE BEGIN (* Put items not found into another array *)
        WRITE('. ');
        NOTFOUND[K] := SORTARRAY[I];
        K := K + 1;
      END;
    WRITELN(DEST);WRITELN(DEST);
    IF J > 0
      THEN BEGIN
        J := J - 1;
        WRITELN(DEST,'List of items found in infotable for : ',
          DIRECTORY.TESTNAME);
        FOR I := 0 TO J DO
          BEGIN
            IF (I MOD 10) = 0 THEN WRITELN(DEST);
            WRITE(DEST,FOUNDARRAY[I];7);
          END;
        END
        ELSE WRITELN(DEST,'There are no items in the infotable for : ',
          DIRECTORY.TESTNAME);
        WRITELN(DEST);WRITELN(DEST);
        IF K > 0
          THEN BEGIN
            K := K - 1;
            WRITELN(DEST,'List of items not used in : ',
              DIRECTORY.TESTNAME);
            FOR I := 0 TO K DO
              BEGIN
                IF (I MOD 10) = 0 THEN WRITELN(DEST);
                WRITE(DEST,NOTFOUND[I];7);
              END;
            END
            ELSE WRITELN(DEST,'All items are used in : ',DIRECTORY.TESTNAME);
            WRITELN(DEST);WRITELN(DEST);
            CLOSE(DEST,NORMAL);
            IF (DESTNAME = 'CONSOLE:') THEN STALL;
          END; (* Findunused *)

```

```
(* ..... *)
```

```

BEGIN (* Findinfo *)
  LOADTEST('Find items for which subtest? ');
  IF ESCPROC THEN EXIT(FINDINFO);

```

```
PAGE(OUTPUT);
LOADINFO(CURRINDEXRECNUM);
FINDMENU;
CASE GETCHAR({'1'..'6'},TRUE,FALSE,TRUE) OF
  '1' : ;
  '2' : FINDITEM('NOWHERE');
  '3' : FINDITEM('CONSOLE:');
  '4' : FINDITEM('PRINTER:');
  '5' : FINDUNUSED('CONSOLE:');
  '6' : FINDUNUSED('PRINTER:');
END; (* cases *)
END; (* Findinfo *)
```

```

(*-----*)
(*      Textfile : SMGR.DIR/S.ANALYZE.TEXT      Volume : TFILES      *)
(*      Codefile : S.MGR.CODE ('Include' file)   Volume : CATDATA    *)
(*-----*)
(*      DEC. 21, 1982      NPROC      *)
(*-----*)
(*
(* This procedure allows a user to examine each row of the info table. A
(* subtest is selected, and then the destination of the output is entered;
(* either the console, a printer, or a file. The row being analyzed is
(* displayed, followed by a table with the following entries: the column
(* number, the item code number from the infotable, and the infovalue as
(* calculated from the A, B, and C parameters. The formula for this calcu-
(* lation is in procedure INFO. After displaying the table for twenty
(* columns, a sum is displayed. This is the sum of all of the infovalues
(* for the particular row being analyzed. Then the next row is displayed
(* etc. until all of the rows of the infotable for this subtest have been
(* shown. An option is available to display only the sums for each row,
(* eliminating all of the individual item codes and infovalues.
(*
(*-----*)

```

(\* This is an 'include' file for program S.MGR. \*)

PROCEDURE ANALYZE;

VAR ROW,

COLUMN,

HEADR,

DIRSLOT,

DATAREC,

ITEMS,

ICODE : INTEGER;

A, B, C,

T,

INFOVAL : REAL;

SUM : PACKED ARRAY[1..INFOROW] OF REAL;

SELECT : CHAR;

PRINTALL : BOOLEAN;

(\* ..... \*)

(\* Bounded exponential function \*)

(\* This function is called by : Function Info \*)

FUNCTION EXPF( X : REAL ) : REAL;

CONST XMAX = 29.0;

XMIN = -87.0;

VAR Y : REAL;

BEGIN

IF X < XMIN THEN

Y := XMIN

ELSE IF X > XMAX THEN

Y := XMAX

ELSE

Y := X;

EXPX := EXP(Y);

END; (\* Function Expf \*)

(\* ----- \*)

(\* Calculate info value from A, B, C parameters for this Theta. \*)

(\* This function is called by : Procedure ANALYZE. \*)

FUNCTION INFO( T, A, B, C : REAL ) : REAL;

CONST D = 1.7; (\* Scaling Factor \*)

VAR DA,

THP,

Y,

Z,

ZC : REAL;

BEGIN

DA := D \* A;

Y := DA \* (B - T);

```

Z := EXPF(Y);
ZC := Z * C;
TMP := DA * DA * (Z - ZC) / (1.0 + ZC);
INFO := TMP * (1 / ((1.0 + Z) * (1.0 + Z)));
END;  (* Function Info *)

(* ----- *)

(* get the output destination *)
(* this procedure is called by : Procedure ANALYZE *)
PROCEDURE GETOUTPUTDEST;
BEGIN
  PAGE(OUTPUT);
  GOTOXY(20,0);
  WRITE('SELECT OUTPUT MENU');
  GOTOXY(0,4);
  WRITE('Select one of the following options by entering its number. ');
  GOTOXY(16,8);
  WRITE('1.  QUIT');
  GOTOXY(16,9);
  WRITE('2.  LIST ROW DATA TO SCREEN');
  GOTOXY(16,10);
  WRITE('3.  LIST ROW DATA TO PRINTER');
  GOTOXY(16,11);
  WRITE('4.  LIST ROW DATA TO TEXT FILE');
  GOTOXY(16,14);
  WRITE('Enter choice # : ');

  SELECT := GETCHAR(['1'..'4'],TRUE,FALSE,TRUE);
  CASE SELECT OF
    '1' : EXIT(ANALYZE);
    '2' : REWRITE(DEST,'CONSOLE:');
    '3' : REWRITE(DEST,'PRINTER:');
    '4' : GETNEWFILE;  (* Procedure located in textfile S.UTL *)
  END;  (* cases *)
END;  (* getoutputdest *)

(* ----- *)

(* Get level of print detail, ie, either all information, or just the
(* sums of the rows. *)
(* This function is called by : Procedure Analyze. *)

FUNCTION PRINTDETAIL : BOOLEAN;
VAR OPTION : CHAR;
BEGIN
  PAGE(OUTPUT);
  GOTOXY(20,0);
  WRITE('SELECT OUTPUT MENU');
  GOTOXY(0,4);
  WRITE('Select one of the following options by entering its number. ');
  GOTOXY(16,8);
  WRITE('1.  QUIT');
  GOTOXY(16,9);
  WRITE('2.  LIST ALL ROW DATA');
  GOTOXY(16,10);
  WRITE('3.  LIST ONLY THE SUM OF EACH ROW');
  GOTOXY(16,13);
  WRITE('Select choice # : ');

  OPTION := GETCHAR(['1'..'3'],TRUE,FALSE,TRUE);
  CASE OPTION OF
    '1' : EXIT(ANALYZE);
    '2' : PRINTDETAIL := TRUE;
    '3' : PRINTDETAIL := FALSE;
  END;  (* cases *)
END;  (* Printdetail *)

(* ----- *)

(* This procedure prints error messages if there is incorrect infotable *)
(* data, and then it exits from procedure ANALYZE. *)
(* This procedure is called by : Procedure ANALYZE. *)

```

```

PROCEDURE ERROR(ERTYPE, NUMBER : INTEGER);
BEGIN
    (* SQUAWK is located in S.UTLS -- it rings the bell. *)
    SQUAWK;

    CASE ERTYPE OF
        1 : BEGIN (* DIRSLOT will cause a value range error *)
            IF NUMBER < 0 THEN
                WRITELN('NO INFOTABLE EXISTS FOR ', DIRECTORY.TESTNAME);
            IF NUMBER > 300 THEN
                WRITELN('INFOTABLE POINTER IS TOO BIG!!  VERIFY IT. ');
            END;

        2 : BEGIN (* ICODE will cause a value range error *)
            IF NUMBER < 0 THEN
                WRITELN('INCORRECT ITEM CODE!  IT WAS ', NUMBER);
            END;
        END; (* cases *)
    WRITELN;

    (* STALL is located in S.UTLS -- it waits for a <CR>. *)
    STALL;

    (* These files were open in ANALYZE when the error occurred. *)
    CLOSE(FILEITEMINFO, LOCK);
    CLOSE(DEST, LOCK);
    EXIT(ANALYZE);
END; (* error *)

(* ----- *)

(* This procedure prints out the results of the infovalue calculations. *)
(* This procedure is called from Procedure ANALYZE. *)
PROCEDURE RESULTS(COLUMN, ROW : INTEGER ; PRINTALL : BOOLEAN ;
    T, INFOVAL, TOTAL : REAL);
BEGIN
    IF PRINTALL THEN BEGIN (1)

        (* print headings *)
        IF (COLUMN = 1) THEN BEGIN (2)
            (* DEST is declared and initialized in ***** *)
            WRITELN(DEST);
            WRITELN(DEST);
            PAGE(OUTPUT);

            (* DIRECTORY.TESTNAME is declared in
              and is initialized in Procedure ***** *)
            WRITELN(DEST, 'SUBTEST : ', DIRECTORY.TESTNAME);
            WRITELN(DEST);

            (* T is global to procedure ANALYZE, and it is initialized
              also in procedure ANALYZE. *)
            WRITELN(DEST, 'Theta : ', T);
            WRITELN(DEST);
            FOR HEADR := 1 TO 4 DO
                WRITE(DEST, ' COL ITEM# INFOVALUE ');

            (* screen automatically wraps around, printer will not. *)
            IF NOT (SELECT='2') THEN WRITELN(DEST);

            FOR HEADR := 1 TO 4 DO
                WRITE(DEST, ' ----- ');
            WRITELN(DEST);
        END; (2)

        IF NOT (SELECT = '2') THEN WRITELN('Printing row : ', ROW);

        WRITE(DEST, COLUMN:3, ICODE:6, INFOVAL:11:7);
        IF (COLUMN MOD 4) = 0 THEN WRITELN(DEST);
        IF (COLUMN = ITEMS) THEN BEGIN (3)
            WRITELN(DEST);
            WRITELN(DEST, 'Sum for THETA = ', T, ' : ', TOTAL);
            WRITELN(DEST);
        END; (3)
    END;
END;

```

```

(* stall if not writing to file *)
(* Procedure STALL is located in S.UTLS *)
IF NOT (SELECT = '3') THEN STALL;
END; (3)
END; (1)
ELSE

(* Print only the sum of the infovalues for each row in infotable *)
BEGIN (4)
  IF (COLUMN = 1) AND (ROW = 1) THEN BEGIN (5)
    PAGE(OUTPUT);
    Writeln(DEST,'SUBTEST : ',DIRECTORY.TESTNAME);
    Writeln(DEST);
  END; (5)
  IF COLUMN = ITEMS THEN BEGIN (6)
    Writeln(DEST,'THETA : ',T,'      SUM : ', TOTAL);

    IF ((ROW MOD 4) = 0) THEN Writeln(DEST);

    (* 16 lines per screen *)
    IF (SELECT = '2') AND ((ROW MOD 16) = 0) THEN BEGIN (7)
      Writeln(DEST);
      STALL;
      PAGE(OUTPUT);
      Writeln(DEST,'SUBTEST : ',DIRECTORY.TESTNAME);
      Writeln(DEST);
    END; (7)
  END; (6)

  (* stop after last item *)
  IF (SELECT = '2') AND (ROW = INFOROW) AND (COLUMN = ITEMS)
  THEN BEGIN (8)
    Writeln(DEST);
    STALL;
  END; (8)
END; (4)
END; (* results *)

(* ----- *)

(* print a histogram of the sums *)
(* This procedure is called by : Procedure ANALYZE *)
PROCEDURE GRAPH;
VAR N,SIZE : INTEGER;
    HALFSIZE : BOOLEAN;

(* ..... *)

PROCEDURE GRAPHMENU;
VAR OPTION : CHAR;
BEGIN
  PAGE(OUTPUT);
  GOTOXY(20,0);
  WRITE('GRAPH MENU');
  GOTOXY(0,4);
  WRITE('Select one of the following options by entering its number. ');
  GOTOXY(16,8);
  WRITE('1. NO GRAPH');
  GOTOXY(16,9);
  WRITE('2. DISPLAY GRAPH ON SCREEN');
  GOTOXY(16,10);
  WRITE('3. DISPLAY GRAPH ON PRINTER');
  GOTOXY(16,11);
  WRITE('4. WRITE GRAPH OUT TO FILE');
  GOTOXY(16,14);
  WRITE('Select choice # : ');

  OPTION := GETCHAR(['1'..'4'],TRUE,FALSE,TRUE);
  CASE OPTION OF
    '1' : EXIT(GRAPH);
    '2' : REWRITE(DEST,'CONSOLE:');
    '3' : REWRITE(DEST,'PRINTER:');
  
```

```

    '4' : GETNEWFILE;
    END; (* cases *)
    END; (* graphmenu *)

    (* ----- *)

    FUNCTION TOOLONG : BOOLEAN;
    VAR MAX : REAL;
    ROW : INTEGER;
    BEGIN
        MAX := 0.0;
        FOR ROW := 1 TO INFOROW DO
            BEGIN
                IF SUM(ROW) > MAX THEN
                    MAX := SUM(ROW);
                END;
            IF MAX > 60.0 THEN
                TOOLONG := TRUE
            ELSE
                TOOLONG := FALSE;
            END; (* toolong *)
        END;

    (* ..... *)

    BEGIN (* graph *)
        GRAPHMENU;
        PAGE(OUTPUT);
        WRITELN('READY TO PRINT GRAPH OF RESULTS');
        WRITELN('Be certain paper is aligned if using a printer. ');
        WRITELN;
        STALL;
        PAGE(OUTPUT);
        WRITELN('WRITING GRAPH... ');
        HALFSIZE := TOOLONG;

        (* print top heading and scale *)
        WRITELN(DEST, 'SUBTEST : ', DIRECTORY.TESTNAME);
        WRITELN(DEST);
        WRITELN(DEST, 'SUM OF ITEM INFORMATION VALUES OF BEST ',
            ITEMS, ' ITEMS');
        WRITELN(DEST);
        WRITE(DEST, ' THETA SUM ');
        FOR N := 1 TO 54 DO
            IF (N MOD 9) = 0 THEN
                IF HALFSIZE THEN
                    WRITE(DEST, ( (N DIV 9) * 20) )
                ELSE
                    WRITE(DEST, ( (N DIV 9) * 10) )
                ELSE
                    WRITE(DEST, ' ');
            WRITELN(DEST);
            WRITE(DEST, ' ----- ');
            FOR N := 1 TO 60 DO
                IF (N MOD 10) = 0 THEN
                    WRITE(DEST, '|')
                ELSE
                    WRITE(DEST, '-');
            WRITELN(DEST);

            (* print data and graph *)
            FOR ROW := 1 TO INFOROW DO
                BEGIN (1)
                    T := THIN + (DT * (ROW-1)); (* T is THETA value *)
                    WRITE(DEST, T:6:3, SUM(ROW):8:3, '|');
                    IF HALFSIZE THEN
                        SIZE := TRUNC(SUM(ROW)/2)
                    ELSE
                        SIZE := TRUNC(SUM(ROW));
                    FOR N := 1 TO SIZE DO
                        WRITE(DEST, '.');
                    WRITELN(DEST);
                END; (1)
            END;
        END;
    
```

```

(* print scale at bottom of graph *)
WRITE(DEST,' ');
FOR N := 1 TO 60 DO
  IF (N MOD 10) = 0 THEN
    WRITE(DEST,'|')
  ELSE
    WRITE(DEST,'-');
  WRITELN(DEST);
  WRITE(DEST,' ');
  FOR N := 1 TO 54 DO
    IF (N MOD 9) = 0 THEN
      IF HALFSIZE THEN
        WRITE(DEST, ( (N DIV 9) * 20) )
      ELSE
        WRITE(DEST, ( (N DIV 9) * 10) )
      ELSE
        WRITE(DEST,' ');
    WRITELN(DEST);
  STALL;
  CLOSE(DEST,LOCK);
END; (* graph *)

(* ..... *)

BEGIN (* Analyze *)

  (* Procedure LOADTEST is located in textfile S.MGR. *)
  LOADTEST('Analyze rows for which subtest? ');

  (* the boolean ESCPROC is global to S.MGR, and it is initialized in
  Procedure LOADTEST. *)
  IF ESCPROC THEN EXIT(ANALYZE);
  PAGE(OUTPUT);

  (* load the directory locations *)
  (* Procedure LOADINFO is located in textfile S.MGR *)
  LOADINFO(CURRINDEXRECNUM + MAXSUBTESTS + 1);

  (* PRINTALL is a boolean - False if only want to print Sums,
  True if print infovalues & itemcodes. *)
  PRINTALL := PRINTDETAIL;

  REPEAT
    PAGE(OUTPUT);
    WRITELN('A sum of infovalues will be computed. Only the best ',INFOCOLUMNS);
    WRITELN('items in each row of the infotable are available for use');
    WRITELN('in the computation. You may select fewer. ');
    WRITELN;
    WRITE('Enter the number of items per row to be summed over : ');
    READLN(ITEMS);
    (* INFOCOLUMNS is a global constant *)
    IF (ITEMS > INFOCOLUMNS) OR (ITEMS <= 1) THEN SQUAWK;
  UNTIL (ITEMS<=INFOCOLUMNS) AND (ITEMS > 1);

  GETOUTPUTDEST;
  (* FILEITEMINFO is global to S.MGR -- DATANAME is a global constant *)
  RESET(FILEITEMINFO,DATANAME);

  PAGE(OUTPUT);
  (* INFOROW is a global constant *)
  FOR ROW := 1 TO INFOROW DO
    BEGIN (1)
      (* TMIN and DT are global constants *)
      T := TMIN + (DT * (ROW-1)); (* T is THETA value *)
      SUM(ROW) := 0;

      FOR COLUMN := 1 TO ITEMS DO
        BEGIN (3)

          (* INFOTABLE is declared and initialized in Procedure INFOSETUP in
          textfile S.MGR *)
          DIRSLOT := INFOTABLE(COLUMN,ROW);
          IF (DIRSLOT<0) OR (DIRSLOT>300) THEN ERROR(1,DIRSLOT);

```

```

(* DIRECTORY.ITEMCODE is global to S.MGR, and is initialized in
   Procedure LOADTEST in textfile S.MGR *)
ICODE := DIRECTORY.ITEMCODE(DIRSLOT);
IF ICODE < 0 THEN ERROR(2,ICODE);

(* HASH is an integer function in textfile S.MGR *)
DATAREC := HASH(DIRSLOT);

SEEK(FILEITEMINFO,DATAREC);
GET(FILEITEMINFO);

(* ITEMINFO is global to S.MGR *)
ITEMINFO := FILEITEMINFO^;
A := ITEMINFO.A;
B := ITEMINFO.B;
C := ITEMINFO.C;
INFOVAL := INFO(T,A,B,C);
SUM(ROW) := SUM(ROW) + INFOVAL;

(* print values calculated *)
RESULTS(COLUMN, ROW, PRINTALL, T, INFOVAL, SUM(ROW));
END; (3)
END; (1)
CLOSE(FILEITEMINFO,LOCK);
CLOSE(DEST,LOCK);
GRAPH;
END; (* analyze *)

```

**GMGR.DIR:**  
**Subdirectory - Graphics Management**



```
(*S+*)
(*-----*)
(*      Textfile : G.MGR.TEXT           Volume : TFILES      *)
(*      Codefile : G.MGR.CODE          Volume : CATDATA      *)
(*-----*)
(* File last modified : Feb 28, 1983      NPRDC              *)
(*-----*)
```

```
PROGRAM GRAPHICS_TEST_MANAGER;
USES CHAINSTUFF,
    PCRAF,
    APPLESTUFF,
    REALMODES,
    TRANSCEND;
```

```
CONST (* available screen dimensions *)
    NORTH = 191;
    SOUTH = 32;
    WEST = 0;
    EAST = 559;
```

```
(* screen dimensions *)
XSCREEN = 79;
YSCREEN = 23;
```

```
(* screen boundaries for question text *)
(* lines 20 -23 reserved for system messages *)
TOPMAX = 0;
LEFTMAX = 0;
BOTTOMMAX = 19;
```

```
GOTOFLAG = 128;
PAGEFLAG = 129;
UNUSEDFLAG = 130;
ENDITEM = 131;
```

```
(* ascii values *)
ETX = 3; (* control-c *)
BELL = 7;
NUL = 0;
LARROW = 8;
RARROW = 21;
RET = 13;
UP = 11; (* up arrow *)
DOWN = 10; (* down arrow *)
ESC = 27;
SPACE = 32;
PAGEOUT = 16; (* cntrl-p on apple ii *)
ASCIIOFFSET = 48; (* ascii zero *)
```

```
INDEXNAME = 'CATDATA:TESTINDEX.DATA'; (* test directory *)
```

```
(* slots available in directory *)
MAXSUBTESTS = 20;
(* maximum question pool per test *)
MAXITEMPOOL = 300;
```

```
VERSION = '{1.03}';
```

```
TYPE DIRDATA = PACKED RECORD (* directory for tests *)
    UNUSED : BOOLEAN; (* tells if record occupied *)
    TESTNAME : STRING; (* name of subtest *)
    (* subtest directory of question id codes *)
    ITEMCODE : PACKED ARRAY
        [0..MAXITEMPOOL]
        OF INTEGER;
```

```
END;
```

SETOFCHAR = SET OF CHAR;

```

VAR X1, X2, Y1, Y2,
    XCOORD,
    YCOORD,
    HEADING,
    CURRINDEXRECNUM, (* subtest record *)
    I,                (* counter *)
    RSET,              (* right border set by user *)
    LSET,              (* left border set by user *)
    TSET,              (* top border set by user *)
    BSET,              (* bottom border set by user *)
    CURRBLOCK,         (* current block read/write *)
    CURRFREEPTR,       (* current byte location in current block *)
    OLDY,              (* last x-location you were at on graphics screen *)
    OLDY,              (* last y-location *)
    X,                 (* graphic screen coordinates *)
    Y : INTEGER;

COMPRESSED,           (* true ==> graphics is compressed *)
ESCPROC,              (* true ==> quit program *)
FOREVER,              (* true ==> stay in loop *)
ERASE,                (* true ==> arrows will erase *)
FASTCURSOR,          (* true ==> make piclette cursor go faster *)
T,B,R,L,             (* true ==> borders were set by user *)
PREVTRAVEL,          (* true ==> user moved cursor *)
PREVBLACK,           (* true ==> last location was black *)
NOMORE : BOOLEAN;    (* true ==> nothing left to do *)

starttime,
endtime,
elapsed : real;

CH,
ESCAPE,
TLEFT,
TRIGHT,
TUP,
TDOWN,
COMMAND,
OUTPUT : CHAR;

FNAME,
DESTNAME,             (* where you want the picture krunched to *)
SOURCENAME,           (* what fotofile you want to load *)
VNAME,
SUBTEST_CHAR : STRING;

(* saves old screen colors where top and bottom borders lie *)
TLINE,
BLINE : PACKED ARRAY(WEST..EAST) OF BOOLEAN;

(* saves old screen colors where left and right borders lie *)
RLINE,
LLINE : PACKED ARRAY(SOUTH..NORTH) OF BOOLEAN;

(* graphics screen buffer *)
(* gbuffer always reflects the original picture *)
(* dotbuff reflects whats left of original picture after each *)
(* stage of krunching *)
GBUFFER,
DOTBUFF : PACKED ARRAY(WEST..EAST,SOUTH..NORTH) OF BOOLEAN;

(* compression data 4 blocks worth *)
TRIX : RECORD CASE INTEGER OF

```

```
1 : (ITEMBUF : ARRAY[0..1023] OF INTEGER);
2 : (ASCIIBUF : PACKED ARRAY[0..2047] OF 0..139);
END;
```

```
(* directory record information *)
DIRINFO : ARRAY[0..MAXSUBTESTS] OF RECORD
```

```
    (* record occupied *)
    NOTUSED : BOOLEAN;
```

```
    (* subtest name *)
    TNAME : STRING;
```

```
    (* # items in subtest *)
    ITEMCOUNT : INTEGER;
END;
```

```
screen : packed array[0..79,0..23] of char;
```

```
DIRECTORY : DIRDATA;
FILE_DIRECTORY : FILE OF DIR_DATA;
```

```
(* graphics screen file *)
GSCREEN : INTERACTIVE;
```

```
(* compression file *)
GTEXT : FILE;
```

```
PROCEDURE PAGE(DUMMY : CHAR); FORWARD;
PROCEDURE SQUAWK; FORWARD;
FUNCTION GETCHAR(OKSET : SETOFCHAR; FORWARD;
                FLUSHQUEUE,ECHO,BEEP : BOOLEAN) : CHAR; FORWARD;
PROCEDURE STALL; FORWARD;
PROCEDURE BLANKLINES(START,COUNT,ENDCURSOR : INTEGER); FORWARD;
FUNCTION TIME : REAL; FORWARD;
PROCEDURE CGOTOXY(X,Y : INTEGER); FORWARD;
PROCEDURE CWRITESTR(GSTR : STRING); FORWARD;
PROCEDURE CWRITECHR(GCHR : CHAR); FORWARD;
PROCEDURE CLEARBOTTOM; FORWARD;
PROCEDURE WRITEITEMBLOCK(WHICHBLOCK : INTEGER); FORWARD;
PROCEDURE READITEMBLOCK(WHICHBLOCK : INTEGER); FORWARD;
PROCEDURE TRAVEL(COORD : CHAR; VALUE : INTEGER); FORWARD;
PROCEDURE MAINMENU; FORWARD;
```

```
(*! /FILES/GMGR.DIR/G.1SUBRT.TEXT *)
```

```
(*! /FILES/GMGR.DIR/G.2SUBRT.TEXT *)
```

```
(*! /FILES/GMGR.DIR/G.UTL.TEXT *) (* graphic utilities *)
```

```
(*! /FILES/GMGR.DIR/G.SUBRT.TEXT *)
```

```
(* main line program *)
BEGIN (* graphicstmgr *)
  FOREVER := TRUE;
  GETDIRINFO;
  REPEAT
    ESCPROC := FALSE;
    LOADTEST('Edit graphics for which subtest? : ');
    IF ESCPROC THEN
      FOREVER := FALSE
    ELSE
      BEGIN
        SUBTEST_CHAR := ' ';
        SUBTESTCHAR[1] := CHR(CURRINDEXRECNUM+65);
        INITIAL;
      END
    END
  UNTIL ESCPROC;
END;
```

```

FASTCURSOR := FALSE;
ERASE := FALSE;
PREVBLACK := FALSE;
FIND;
MAINMENU;

REPEAT
  READ (KEYBOARD,CH);

  CASE CH OF
    '7' : PLOT('7',0);
    '9' : PLOT('9',0);
    '1' : PLOT('1',0);
    '3' : PLOT('3',0);
    '4' : PLOT('X',-1);
    '5' : PLOT('5',0);
    '6' : PLOT('X', 1);
    '8' : PLOT('Y', 1);
    '2' : PLOT('Y',-1);
    'D','d' : Draw;
    'C','c' : Characters;
    'H','h' : Find;
    'P','p' : Polygon;
    'R','r' : BEGIN
      PAGE(OUTPUT);
      TEXTON;
      WRITE('Clear graphics screen ? Y/N : ');
      IF GETCHAR(['Y','N','y','n'],TRUE,TRUE,TRUE) IN
        ['Y','y'] THEN
        BEGIN
          GRAFIXON;
          Remove;
        END
      ELSE
        GRAFIXON;
      END;
    'L','l' : Load;
    'S','s' : Save;
    'T','t' : ERASE := TRUE;
    'N','n' : FASTCURSOR := FALSE;
    'E','e' : ERASE := FALSE;
    'F','f' : FASTCURSOR := TRUE;
    'K','k' : KRUNCH;

  OTHERWISE
    IF (CH = TLEFT) THEN
      TRAVEL('X',-1)
    ELSE
      IF (CH = TRIGHT) THEN
        TRAVEL('X', 1)
      ELSE
        IF (CH = TUP) THEN
          TRAVEL('Y', 1)
        ELSE
          IF (CH = TDOWN) THEN
            TRAVEL('Y',-1);
          END;
        END;
      END;
    END;

  UNTIL CH IN ['Q','q'];
  CLOSE (GSCREEN,NORMAL);

  END;
UNTIL NOT FOREVER;

  SETCHAIN('CATDATA:CATPROJECT');

END.

```

```
(*****)
(* FILE : G.UTL.TEXT *)
(* File last modified : Feb 25,1983 *)
(*****)
```

(\* clear the screen and put cursor at 0,0 \*)

```
PROCEDURE PAGE;
BEGIN
  WRITE(CHR(28));
  GOTOXY(0,0);
END; (* page *)
```

(\*\*\* rings the bell \*\*\*)

```
PROCEDURE SQUAWK;
BEGIN
  WRITE(CHR(BELL));
END; (* squawk *)
```

(\* read an acceptable character from the keyboard \*)

```
FUNCTION GETCHAR;
VAR MASK : PACKED ARRAY(0..0) OF CHAR;
BEGIN
  IF FLUSHQUEUE THEN UNITCLEAR(2); (* flush buffer *)
  REPEAT
    UNITREAD(2,MASK,1);
    IF BEEP AND NOT (MASK[0] IN OKSET) THEN SQUAWK;

    UNTIL MASK[0] IN OKSET;
    IF ECHO AND (MASK[0] IN (CHR(32)..CHR(126))) THEN
      WRITE(MASK[0]);
    GETCHAR := MASK[0];
  END; (* getchar *)
```

(\*\*\* display a message/wait for a keystroke \*\*\*)

```
PROCEDURE STALL;
VAR STALLCHAR : CHAR;
BEGIN
  WRITE('Press <RET> to continue ');
  STALLCHAR :=
    GETCHAR([CHR(RET),CHR(ESC)],TRUE,FALSE,TRUE);
  IF STALLCHAR = CHR(ESC) THEN EXIT(PROGRAM);
END; (* stall *)
```

(\*\*\* blank out lines \*\*\*)

```
PROCEDURE BLANKLINES;
VAR I : INTEGER;
BEGIN
  GOTOXY(0,START);
  FOR I := 1 TO (COUNT-1) DO
    WRITELN(' ' : 39);
  WRITE(' ',39);
  GOTOXY(0,ENDCURSOR);
END; (* blanklines *)
```

(\* returns the # seconds elapsed since start of the day \*)

```
FUNCTION TIME;
TYPE TIMERECD = RECORD
  S : PACKED ARRAY(1..12) OF CHAR;
END;

VAR HOUR,
    MINUTE,
    SECOND : REAL;

    T : TIMERECD;
    TFILE : FILE OF TIMERECD;
```

BEGIN

```

RESET(TFILE, '.CLOCK');
T := TFILE^;
HOUR := ((ORD(T.S(6)) - 48.0) * 10.0) +
        (ORD(T.S(7)) - 48.0);
MINUTE := ((ORD(T.S(8)) - 48.0) * 10.0) +
        (ORD(T.S(9)) - 48.0);
SECOND := ((ORD(T.S(10)) - 48.0) * 10.0) +
        (ORD(T.S(11)) - 48.0);
TIME := (HOUR * 3600.0) + (MINUTE * 60.0) + SECOND;

```

END; (\* time \*)

(\* does a gotoxy to the grafix screen using text coordinates \*)

```

PROCEDURE GGOTOXY;
VAR XPOS,
    YPOS : INTEGER;
BEGIN
    XPOS := X * 7;
    YPOS := 191 - (Y * 8);
    MOVETO(XPOS, YPOS);
END; (* ggotoxy *)

```

(\* write a string to grafix \*)

```

PROCEDURE GWRITESTR;
BEGIN
    UNITWRITE(3, GSTR(1), LENGTH(GSTR), 0, 12);
END; (* gwritestr *)

```

(\* does a write to graphics screen for char values \*)

```

PROCEDURE GWRITECHR;
VAR C : STRING;
BEGIN
    C := ' ';
    C(1) := GCHR;
    UNITWRITE(3, C(1), 1, 0, 12);
END; (* gwritechr *)

```

(-----)

(\* clear reserved spaced at bottom of graphics screen \*)

```

PROCEDURE CLEARBOTTOM;
BEGIN
    VIEWPORT(0, 559, 0, SOUTH);
    FILLCOLOR(BLACK);
    FILLPORT;
    VIEWPORT(0, 559, 0, 191);
    FILLCOLOR(WHITE);
END; (* clearbottom *)

```

(\* writes the graphics buffer to diskfile \*)

```

PROCEDURE WRITEITEMBLOCK;
VAR BLOCKSTRANSFERRED : INTEGER;
    BADIO : BOOLEAN;
BEGIN
    BADIO := FALSE;
    RESET(GTEXT, DESTNAME);
    BLOCKSTRANSFERRED := BLOCKWRITE(GTEXT, TRIX.ITEMBUF, 4, WHICHBLOCK);
    BADIO := ((BLOCKSTRANSFERRED < 4) OR (IORESULT <> 0));
    CLOSE(GTEXT, LOCK);
    IF BADIO THEN
    BEGIN
        WRITELN;
        WRITELN;
        WRITE('Block ', WHICHBLOCK, ' write error.');
```

```

        WRITELN;
        READLN;
        EXIT (PROGRAM);
    END;
END; (* writeitemblock *)

```

```

(* reads a block from disk into the item ascii buffer *)
PROCEDURE READITEMBLOCK;
VAR BLOCKSTRANSFERRED : INTEGER;
    BADIO : BOOLEAN;
BEGIN
    BADIO := FALSE;
    RESET (GTEXT, DESTNAME);
    BLOCKSTRANSFERRED := BLOCKREAD (GTEXT, TRIX.ITEMBUF, 4, WHICHBLOCK);
    BADIO := ((BLOCKSTRANSFERRED < 4) OR (IORESULT <> 0));
    CLOSE (GTEXT, LOCK);
    IF BADIO THEN
    BEGIN
        WRITELN;
        WRITELN;
        WRITE (' Block ', WHICHBLOCK, ' write error. ');
        WRITELN;
        READLN;
        EXIT (PROGRAM);
    END;
END; (* readitemblock *)

```

```

(* main menu of commands *)
PROCEDURE MAINMENU;
BEGIN
    CLEARBOTTOM;
    GOTOXY (0, 20);
    GWRITESTR ('SUBTEST : ');
    GWRITESTR (DIRECTORY.TESTNAME);
    PENCOLOR (WHITE);
    FILLCOLOR (BLACK);
    GOTOXY (0, 21);
    GWRITESTR (
        'Normal cursor      Fast cursor      Draw line      Slave file      Remove');
    GOTOXY (0, 22);
    GWRITESTR (
        '< keypad #s draw>    Polygon      Home      Load file      Runch');
    GOTOXY (0, 23);
    GWRITESTR (
        '< arrows to move>    Characters      Erase off      Turn erase on      Quit');
    PENCOLOR (BLACK);
    FILLCOLOR (WHITE);
    VIEWPORT (0, 559, 32, 191);
    MOVETO (0, 32);
END; (* main menu *)

```

```

(* writes the directory information to record *)
(* puts necessary file info in main memory *)
PROCEDURE GETDIRINFO;
VAR I, K, ICOUNT : INTEGER;
BEGIN

```

```

    (* initialize the directory information *)
    FOR I := 0 TO MAXSUBTESTS DO
        DIRINFO[I].NOTUSED := TRUE;

```

```

    (* get the directory information *)
    I := 0;
    RESET (FILEDIRECTORY, INDEXNAME);
    REPEAT
        SEEK (FILEDIRECTORY, I);
        GET (FILEDIRECTORY);
        IF NOT (FILEDIRECTORY^.UNUSED) THEN
            BEGIN

```

```
    DIRECTORY := FILEDIRECTORY^;  
    DIRINFO[1].NOTUSED := FALSE;  
    DIRINFO[1].TNAME := DIRECTORY.TESTNAME;  
    ICOUNT := 0;  
    DIRINFO[1].ITEMCOUNT := ICOUNT;  
  END;  
  I := I + 1;  
  UNTIL I > MAXSUBTESTS;  
  CLOSE (FILEDIRECTORY,NORMAL);  
END; (* getdirinfo *)
```

```
(*-----*)
(* File last modified : May 6, 1983          NPRDC          *)
(*-----*)
(* G.SUBRT *)
```

```
(* this procedure clears the entire screen          *)
(* this procedure is embedded in procedure edit      *)
PROCEDURE REMOVE;
BEGIN
  VIEWPORT(0,559,0,191);
  FILLCOLOR(BLACK);
  FILLPORT;

  VIEWPORT(0,559,32,191); (* this initializes the drawing viewport *)
  FILLCOLOR(WHITE);
  FILLPORT;
  MAINMENU;

END;      (* remove *)
```

```
(* this procedure clears the last four rows of the graphics screen *)
(* this procedure is embedded in procedure edit      *)
PROCEDURE BOTTOM(BOTTOM_COLOR : SCREENCOLOR);
BEGIN
  VIEWPORT(0,559,0,32);
  FILLCOLOR(BOTTOM_COLOR);
  FILLPORT;
  VIEWPORT(0,559,32,191);

END;      (* bottom *)
```

```
(* this procedure is embedded in procedure edit      *)
PROCEDURE INITIAL;
VAR
  ASCII : PACKED ARRAY(0..0) OF 0..255;
  I : INTEGER;
  TESTNAME_LENGTH : INTEGER;

BEGIN
  INITGRAFIX;

  GRAFIXMODE(BW560,1);

  REMOVE;

  GRAFIXON;

  XCOORD := 0;
  YCOORD := 0;

  TLEFT := CHR(8);
  TRIGHT := CHR(21);
  TUP := CHR(11);
  TDOWN := CHR(10);

  ESCAPE := CHR(27);

  X1 := 0;
  X2 := 0;
  Y1 := 0;
  Y2 := 0;

  PREVTRAVEL := FALSE;

  REWRITE(GSCREEN, '.GRAFIX');
END;      (* initial *)
```

```

(* this procedure plots points on the screen *)
(* this procedure is embedded in procedure edit *)
PROCEDURE PLOT(COORD : CHAR; VALUE : INTEGER);
BEGIN
  XCOORD := XLOC;
  YCOORD := YLOC;

  IF ERASE THEN
    BEGIN
      PENCOLOR(WHITE);
      DOTAT(XCOORD,YCOORD);
      PENCOLOR(BLACK);
    END;

  IF COORD = 'X' THEN (* compute new X coordinate *)
    XCOORD := XCOORD + VALUE
  ELSE
    IF COORD = 'Y' THEN (* compute new Y coordinate *)
      YCOORD := YCOORD + VALUE
    ELSE
      IF COORD = '7' THEN (* compute new upper left XY coordinate *)
        BEGIN
          XCOORD := XCOORD - 1;
          YCOORD := YCOORD + 1;
        END
      ELSE
        IF COORD = '9' THEN (* compute new upper right XY coordinate *)
          BEGIN
            XCOORD := XCOORD + 1;
            YCOORD := YCOORD + 1;
          END
        ELSE
          IF COORD = '1' THEN (* compute new lower left XY coordinate *)
            BEGIN
              XCOORD := XCOORD - 1;
              YCOORD := YCOORD - 1;
            END
          ELSE
            IF COORD = '3' THEN (* compute new lower right XY coordinate *)
              BEGIN
                XCOORD := XCOORD + 1;
                YCOORD := YCOORD - 1;
              END;
            END;

    DOTAT(XCOORD,YCOORD);
    SOUND(1,1,63);
    PREV_TRAVEL := FALSE;

    IF NOT ERASE THEN
      BEGIN
        X1 := XLOC;
        Y1 := YLOC;
      END;

  END; (* plot *)

```

```

(* this procedure allows you to enter characters on the graphics screen *)
(* this procedure is embedded in procedure edit *)
PROCEDURE CHARACTERS;
VAR
  ASCII : PACKED ARRAY[0..0] OF 0..255;
  X,Y : INTEGER;
BEGIN
  IF PREV_TRAVEL THEN

```

```

BEGIN
  PENCOLOR(WHITE);
  DOTAT(XLOC,YLOC);
  PENCOLOR(BLACK);
END;

CLEARBOTTOM;
GGOTOXY(0,20);
GWRITESTR('SUBTEST : ');
GWRITESTR(DIRECTORY.TESTNAME);
PENCOLOR(WHITE);
FILLCOLOR(BLACK);
GGOTOXY(0,22);
GWRITESTR('Enter characters.  Arrows move cursor');
GGOTOXY(0,23);
GWRITESTR('Press <ESC> to leave character mode.');
```

PENCOLOR(BLACK);  
FILLCOLOR(WHITE);  
MOVETO(0,39); (\* ALIGNMENT \*)

```

REPEAT
  (* CREATE CURSOR *)
  FILLCOLOR(BLACK);
  VIEWPORT(XLOC,XLOC+6,YLOC-7,YLOC);
  FILLPORT;

  UNITREAD(2,ASCII,1,,12);

  (* DELETE CURSOR *)
  FILLCOLOR(WHITE);
  FILLPORT;

  CASE ASCII[0] OF
    8 : MOVETO(XLOC - 7, YLOC); (* left arrow *)
    21 : MOVETO(XLOC + 7, YLOC); (* right arrow *)
    10 : MOVETO(XLOC,YLOC - 8); (* down arrow *)
    11 : MOVETO(XLOC,YLOC + 8); (* up arrow *)
    13 : MOVETO(0,YLOC - 8); (* return key *)
    27 : ;
  OTHERWISE
    UNITWRITE(3,ASCII,1,,12);
  END;

UNTIL ASCII[0] = 27; (* escape *)

VIEWPORT(0,559,32,191);

PREVTRAVEL := FALSE;

X := XLOC;
Y := YLOC;

MAINMENU;

MOVETO(X,Y);

END; (* characters *)

(* this procedure saves the graphics screen to the volume CATDATA: *)
(* this procedure is embedded in procedure edit *)
PROCEDURE SAVE;
VAR
  QNAME,FNAME : STRING;
  A : PACKED ARRAY[0..0] OF 29..29;
  SELECT : CHAR;
BEGIN
  IF PREVTRAVEL THEN (* eliminate travel dot *)
    BEGIN
```

```

PENCOLOR(WHITE);
DOTAT(XLOC,YLOC);
PENCOLOR(BLACK);
END;

TEXTON;
GOTOXY(8,8);
WRITE(CHR(28));
GOTOXY(18,8);
WRITE('WRITE GRAPHICS MENU');
GOTOXY(8,4);
WRITE('Select one of the following options by entering its number. ');
GOTOXY(16,8);
WRITE('1. QUIT');
GOTOXY(16,9);
WRITE('2. WRITE OUT AS SUBTEST QUESTION');
GOTOXY(16,10);
WRITE('3. WRITE OUT AS SUBTEST SAMPLE QUESTION');
GOTOXY(16,11);
WRITE('4. WRITE TO SPECIFIED FILENAME');
GOTOXY(16,15);
WRITE('Enter Choice # : ');
SELECT := GETCHAR(['1'..'4'],TRUE,TRUE,TRUE);
CASE SELECT OF
  '1' : BEGIN
    PAGE(OUTPUT);
    GRAFIXON;
    EXIT(SAVE);
  END;
  '2' : BEGIN
    BOTTOM(WHITE);
    PAGE(OUTPUT);
    WRITE('Enter the itemcode : ');
    READLN(QNAME);
    FNAME := CONCAT('/CATFOTO/',SUBTESTCHAR,'DIR/G',SUBTEST_CHAR,
      'Q',QNAME,'.FOTO');
  END;
  '3' : BEGIN
    BOTTOM(WHITE);
    PAGE(OUTPUT);
    WRITE('Save as which sample question? <1..5> : ');
    SELECT := GETCHAR(['1'..'5'],TRUE,TRUE,TRUE);
    QNAME := ' ';
    QNAME[1] := SELECT;
    FNAME := CONCAT('/CATFOTO/',SUBTESTCHAR,'DIR/G',SUBTEST_CHAR,
      'SQ',QNAME,'.FOTO');
  END;
  '4' : BEGIN
    BOTTOM(WHITE);
    PAGE(OUTPUT);
    WRITELN('Enter the filename you wish to save graphics in. ');
    WRITELN('You may specify a volume and you must add a ".FOTO" ');
    WRITELN('at the end of the filename. ');
    WRITELN;
    WRITE('Enter filename : ');
    READLN(FNAME);
  END;
END;

GSAVE(FNAME);

WRITELN;
WRITELN;
WRITELN('Graphic pictured saved as ',FNAME);
WRITELN;
STALL;
GRAFIXON;
MAINMENU;
WRITE(CHR(28));
PREVTRAVEL := FALSE;
END;      (* save *)

```

```

(* this procedure loads a graphics file from CATDATA: *)
(* this procedure is embedded in procedure edit *)
PROCEDURE LOAD;
VAR
  QNAME,FNAME : STRING;
  SELECT : CHAR;

PROCEDURE QLOAD;
BEGIN
  PAGE(OUTPUT);
  WRITE('Enter the itemcode : ');
  READLN(QNAME);
  FNAME := CONCAT('/CATFOTO/',SUBTESTCHAR,'DIR/G',SUBTEST_CHAR,
                  'Q',QNAME,'.FOTO');
  (*$!-$)
  RESET(GTEXT,FNAME);
  (*$!+*)

  IF IORESULT <> 0 THEN
  BEGIN
    FNAME := CONCAT('/CATFOTO/',SUBTESTCHAR,'DIR/G',SUBTEST_CHAR,
                    QNAME,'.DATA');
    (*$!-$)
    RESET(GTEXT,FNAME);
    (*$!+*)

    IF IORESULT <> 0 THEN
    BEGIN
      WRITELN;
      WRITELN('No such graphics for this question');
      WRITELN;
      STALL;
      GRAFIXON;
      PAGE(OUTPUT);
      CLOSE(GTEXT,NORMAL);
      EXIT(LOAD);
    END
  ELSE
  BEGIN
    COMPRESSED := TRUE;
    CLOSE(GTEXT,NORMAL);
  END;
  END
ELSE
  BEGIN
    COMPRESSED := FALSE;
    CLOSE(GTEXT,NORMAL);
  END;
END;

END; (* qload *)

PROCEDURE SQLOAD;
BEGIN
  PAGE(OUTPUT);
  WRITE('Read which sample question? <1..5> : ');
  SELECT := GETCHAR(['1'..'5'],TRUE,TRUE,TRUE);
  QNAME := ' ';
  QNAME[1] := SELECT;
  FNAME := CONCAT('/CATFOTO/',SUBTESTCHAR,'DIR/G',SUBTEST_CHAR,
                  'SQ',QNAME,'.FOTO');
  (*$!-$)
  RESET(GTEXT,FNAME);
  (*$!+*)

  IF IORESULT <> 0 THEN
  BEGIN
    FNAME := CONCAT('/CATFOTO/',SUBTESTCHAR,'DIR/G',SUBTEST_CHAR,
                    'SQ',QNAME,'.DATA');
    (*$!-$)
    RESET(GTEXT,FNAME);
  END;
END;

```

```

(*$!+*)
IF IORESULT <> 0 THEN
BEGIN
    WRITELN;
    WRITELN;
    WRITELN('No such graphics for this sample question');
    WRITELN;
    STALL;
    GRAFIXON;
    PAGE(OUTPUT);
    CLOSE(GTEXT,NORMAL);
    EXIT(LOAD);
END
ELSE
BEGIN
    COMPRESSED := TRUE;
    CLOSE(GTEXT,NORMAL);
END;
END;
ELSE
BEGIN
    COMPRESSED := FALSE;
    CLOSE(GTEXT,NORMAL);
END;
END;

END;    (* sqload *)

PROCEDURE FLOAD;
VAR ZNAME : STRING;
    LEAVE : BOOLEAN;
BEGIN
    PAGE(OUTPUT);
    WRITELN('Enter the filename you wish to read the graphics from. ');
    WRITELN('You may specify a volume. ');
    WRITELN;
    WRITE('Enter filename : ');
    READLN(ZNAME);
    IF POS('.FOTO',ZNAME) = 0 THEN
        FNAME := CONCAT(ZNAME, '.FOTO');
    (*$!-*)
    RESET(GTEXT,FNAME);
    (*$!+*)

    LEAVE := FALSE;
    COMPRESSED := FALSE;

    IF IORESULT <> 0 THEN
    BEGIN
        COMPRESSED := TRUE;

        IF (POS('.FOTO',ZNAME) = 0) AND (POS('.DATA',ZNAME) = 0) THEN
        BEGIN
            FNAME := CONCAT(ZNAME, '.DATA');

            (*$!-*)
            RESET(GTEXT,FNAME);
            (*$!+*)

            IF IORESULT <> 0 THEN
                LEAVE := TRUE;
            END
            ELSE
                LEAVE := TRUE;
        END;
    END;
    CLOSE(GTEXT,NORMAL);

    IF LEAVE THEN
    BEGIN
        WRITELN;

```

```

        WRITELN('No such graphics file.');
```

WRITELN;  
STALL;  
GRAFIXON;  
PAGE(OUTPUT);  
EXIT(LOAD);  
END  
END; (\* fload \*)

BEGIN (\* load \*)  
TEXTON;  
GOTOXY(0,0);  
WRITE(CHR(28));  
GOTOXY(18,0);  
WRITE('READ GRAPHICS MENU');  
GOTOXY(0,4);  
WRITE('Select one of the following options by entering its number.');

GOTOXY(16,8);  
WRITE('1. QUIT');

GOTOXY(16,9);  
WRITE('2. READ SUBTEST QUESTION');

GOTOXY(16,10);  
WRITE('3. READ SUBTEST SAMPLE QUESTION');

GOTOXY(16,11);  
WRITE('4. READ GRAPHICS FROM FILENAME');

GOTOXY(16,15);  
WRITE('Enter Choice # : ');  
SELECT := GETCHAR(['1'..'4'],TRUE,TRUE,TRUE);  
CASE SELECT OF  
    '1' : BEGIN  
        PAGE(OUTPUT);  
        GRAFIXON;  
        EXIT(LOAD);  
    END;  
    '2' : QLOAD;  
    '3' : SLOAD;  
    '4' : FLOAD;  
END;

GRAFIXON;  
IF COMPRESSED THEN  
BEGIN  
    DESTNAME := FNAME;  
    DECODEGRAF;  
END  
ELSE  
    GLOAD(FNAME);  
  
BOTTOM(BLACK);  
WRITE(CHR(28));  
MAINMENU;  
PREVTRAVEL := FALSE;  
END; (\* load \*)

```

(* this procedure creates polygons *)
(* this procedure is embedded in procedure edit *)
PROCEDURE POLYGON;
```

```

VAR  
I : INTEGER;  
SIZE, NUMSIDES : INTEGER;
```

```

FUNCTION TANGLE : INTEGER;  
(* this function is embedded in procedure edit *)  
BEGIN  
    IF HEADING < 0 THEN  
        TANGLE := 360 + TANGLE  
    ELSE  
        TANGLE := HEADING;  
END;
```

```

PROCEDURE MOVE(RELDISTANCE : INTEGER);
(* this procedure is embedded in procedure edit *)
CONST
  RADCONST = 57.29578;

BEGIN
  LINETO(ROUND(XLOC + 2 * RELDISTANCE * COS(TANGLE/RADCONST)),
        ROUND(YLOC + RELDISTANCE * SIN(TANGLE/RADCONST)));
END;

PROCEDURE TURN(RELANGLE : INTEGER);
(* this procedure is embedded in procedure edit *)
BEGIN
  HEADING := (HEADING + RELANGLE) MOD 360;
END;

BEGIN
  HEADING := 0;
  TEXTON;
  WRITE('What size polygon ? ');
  READLN(SIZE);
  WRITE('How many sides ? ');
  READLN(NUMSIDES);
  GRAFIXON;

  FOR I := 1 TO NUMSIDES DO
    BEGIN
      MOVE(SIZE);
      TURN(360 DIV NUMSIDES);
    END;

    PREVTRAVEL := FALSE;

  END;    (* polygon *)

(* this procedure draws a line from the last point you plotted to the *)
(* position you are currently are on. *)
PROCEDURE DRAW;
BEGIN
  X2 := XLOC;
  Y2 := YLOC;
  MOVETO(X1,Y1);
  LINETO(X2,Y2);
  X1 := XLOC;
  Y1 := YLOC;
  PREVTRAVEL := FALSE;
END;    (* draw *)

(* this procedure moves you to the lower left hand part *)
(* of the drawing screen *)
(* this procedure is embedded in procedure edit *)
PROCEDURE FIND;
BEGIN
  IF PREVTRAVEL = TRUE THEN
    BEGIN
      PENCOLOR(WHITE);
      DOTAT(XLOC,YLOC);
      PENCOLOR(BLACK);
    END;
    MOVETO(0,32);
  END;    (* find *)

```

```

(* this procedure allows you to travel on the screen without plotting *)
(* a point *)
(* this procedure is embedded in procedure edit *)
PROCEDURE TRAVEL;
VAR MODVALUE : INTEGER;
BEGIN
  XCOORD := XLOC;
  YCOORD := YLOC;

  IF PREVTRAVEL THEN
    BEGIN
      IF (NOT PREVBLACK) THEN
        BEGIN
          PENCOLOR(WHITE);
          DOTAT(XLOC,YLOC);
          PENCOLOR(BLACK);
        END;
      END;

    MODVALUE := VALUE;
    IF FASTCURSOR THEN
      MODVALUE := MODVALUE * 8;

    IF COORD = 'X' THEN
      XCOORD := XCOORD + MODVALUE
    ELSE
      YCOORD := YCOORD + MODVALUE;

    IF XCOORD > EAST THEN
      XCOORD := EAST
    ELSE
      IF XCOORD < WEST THEN
        XCOORD := WEST;

    IF YCOORD > NORTH THEN
      YCOORD := NORTH
    ELSE
      IF YCOORD < SOUTH THEN
        YCOORD := SOUTH;

    MOVETO(XCOORD,YCOORD);

    IF XYCOLOR = 0 THEN
      PREVBLACK := TRUE
    ELSE
      PREVBLACK := FALSE;

    DOTAT(XCOORD,YCOORD);
    PREV_TRAVEL := TRUE;

  END;      (* travel *)

```

```
(*****)
(* FILE : G.1SUBRT.TEXT *)
(* File last modified : Feb 25,1983 *)
(*****)
```

```
(* reads the item text file and displays the graphics *)
SEGMENT PROCEDURE DECODEGRAF;
```

```
VAR X,
    Y,
    X1,Y1,
    CURRPTR,
    CURRBLK,
    DOTCNT : INTEGER;
```

```
(* reads the item text file & displays item text *)
```

```
PROCEDURE DECODEPRINT;
VAR X,
    Y,
    BYTECNT,
    CHARCODE : INTEGER;
```

```
(* return the next code in ascii file *)
```

```
FUNCTION BUFCODE : INTEGER;
BEGIN
    BUFCODE := TRIX.ASCIIBUF(CURRPTR);
    CURRPTR := CURRPTR + 1;
    IF CURRPTR > 2047 THEN
        (* end of block/get next block and reset byte ptr *)
        BEGIN (1)
            CURRBLK := CURRBLK + 4;
            READITEMBLOCK(CURRBLK);
            CURRPTR := 0;
        END; (1)
    END; (* bufcode *)
```

```
BEGIN (* decode print *)
```

```
(* read bytes from the buffer *)
```

```
REPEAT
```

```
(* get char from block buffer *)
```

```
CHARCODE := BUFCODE;
```

```
CASE CHARCODE OF
```

```
    GOTOFLAG : BEGIN (1) (* move cursor *)
        (* next two bytes after flag are x,y coord *)
        X := BUFCODE;
        Y := BUFCODE;
        BYTECNT := BUFCODE;
        GGOTOXY(X,Y);
    END; (1)
```

```
    ENDITEM : ;
```

```
END;
```

```
IF (CHARCODE >= 32) AND (CHARCODE <= 126) THEN
    GWRITECHR(CHR(CHARCODE));
```

```
UNTIL CHARCODE = ENDITEM; (* until end flag hit *)
END; (* decodeprint *)
```

```
BEGIN (* decode graf *)
```

```
PENCOLOR(BLACK);
GRAFIXON;
FILLPORT;
```

```

READITEMBLOCK(0);

CURRBLK := 0;
CURRPTR := 0;

starttime := time;

(* decode the xlines *)
REPEAT
  IF CURRPTR > 1021 THEN
    (* end of block/get new block *)
    BEGIN
      CURRBLK := CURRBLK + 4;
      READITEMBLOCK(CURRBLK);
      CURRPTR := 0;
    END;
  X := TRIX.ITEMBUF(CURRPTR);
  IF X >= 0 THEN
    BEGIN
      Y := TRIX.ITEMBUF(CURRPTR + 1);
      MOVETO(X,Y);
      DOTCNT := TRIX.ITEMBUF(CURRPTR + 2);
      LINEREL(DOTCNT,0);
      CURRPTR := CURRPTR + 3;
    END;
  UNTIL X < 0;

  CURRPTR := CURRPTR + 1;

(* decode the ylines *)
REPEAT
  IF CURRPTR > 1021 THEN
    (* end of block/get new block *)
    BEGIN
      CURRBLK := CURRBLK + 4;
      READITEMBLOCK(CURRBLK);
      CURRPTR := 0;
    END;
  X := TRIX.ITEMBUF(CURRPTR);
  IF X >= 0 THEN
    BEGIN
      Y := TRIX.ITEMBUF(CURRPTR + 1);
      MOVETO(X,Y);
      DOTCNT := TRIX.ITEMBUF(CURRPTR + 2);
      LINEREL(0,DOTCNT);
      CURRPTR := CURRPTR + 3;
    END;
  UNTIL X < 0;

  CURRPTR := CURRPTR + 1;

(* decode the diagonals *)
REPEAT
  IF CURRPTR > 1020 THEN
    (* end of block/get new block *)
    BEGIN
      CURRBLK := CURRBLK + 4;
      READITEMBLOCK(CURRBLK);
      CURRPTR := 0;
    END;
  X := TRIX.ITEMBUF(CURRPTR);
  IF X >= 0 THEN
    BEGIN
      Y := TRIX.ITEMBUF(CURRPTR + 1);
      X1 := TRIX.ITEMBUF(CURRPTR + 2);
      Y1 := TRIX.ITEMBUF(CURRPTR + 3);
      MOVETO(X,Y);
      LINETO(X1,Y1);
      CURRPTR := CURRPTR + 4;
    END;
  UNTIL X < 0;

```

```

CURRPTR := CURRPTR + 1;

(* decode the dots *)
REPEAT
  IF CURRPTR > 1022 THEN
    (* end of block/get new block *)
    BEGIN
      CURRBLK := CURRBLK + 4;
      READITEMBLOCK(CURRBLK);
      CURRPTR := 0;
    END;
  X := TRIX.ITEMBUF(CURRPTR);
  IF X >= 0 THEN
    BEGIN
      Y := TRIX.ITEMBUF(CURRPTR + 1);
      DOTAT(X,Y);
      CURRPTR := CURRPTR + 2;
    END;
  UNTIL X < 0;

CURRPTR := CURRPTR + 1;
CURRPTR := CURRPTR * 2;

DECODEPRINT;

endtime := time;

END;  (* decodegraf *)

(* codes the graphics screen *)
SEGMENT PROCEDURE CODESCREEN;
VAR X,Y,
    X0,Y0,
    DOTCOUNT,
    I : INTEGER;
    DONE : BOOLEAN;

(* code into buffer lines > 1 dot *)
PROCEDURE CODEXLINES;
BEGIN

  FILLCOLOR(BLACK);
  PENCOLOR(WHITE);
  GOTOXY(0,21);
  GWRITESTR('Coding horizontal lines
  FILLCOLOR(WHITE);
  PENCOLOR(BLACK);

  (* start at line zero of screen *)
  Y := TSET;
  REPEAT

    (* point to first pixel on line *)
    X := LSET;

    REPEAT

      (* look for white space *)
      DONE := FALSE;
      REPEAT
        IF NOT (GBUFFER(X,Y)) THEN
          X := X + 1
        ELSE
          DONE := TRUE;
      UNTIL (X > RSET) OR (DONE);

      (* if the whole line was not blank *)
      IF X <= RSET THEN
        BEGIN

```

```

(* save location to move to when decoding *)
X0 := X;
Y0 := Y;

(* find out how many consecutive black dots *)
DOTCOUNT := 0;
DONE := FALSE;
REPEAT
  DOTCOUNT := DOTCOUNT + 1;
  X := X + 1;
  IF X > RSET THEN
    DONE := TRUE
  ELSE
    IF NOT GBUFFER(X,Y) THEN
      DONE := TRUE;
UNTIL DONE;

(* save information only if more than one dot *)
IF DOTCOUNT > 1 THEN
  BEGIN
    FOR I := 0 TO (DOTCOUNT-1) DO
      BEGIN
        DOTAT(X0 + I,Y0);
        DOTBUFF[X0 + I,Y0] := FALSE;
      END;

    (* dont separte information over block boundaries *)
    IF CURRFREEPTR > 1021 THEN
      BEGIN
        WRITEITEMBLOCK(CURRBLOCK);
        CURRBLOCK := CURRBLOCK + 4;
        CURRFREEPTR := 0;
      END;

    TRIX.ITEMBUF [CURRFREEPTR] := X0;
    TRIX.ITEMBUF [CURRFREEPTR + 1] := Y0;
    TRIX.ITEMBUF [CURRFREEPTR + 2] := (DOTCOUNT - 1);
    CURRFREEPTR := CURRFREEPTR + 3;
  END;
END;

UNTIL X > RSET;

(* point to next line *)
Y := Y - 1;

(* until all lines looked at *)
UNTIL Y < BSET;

(* dont separte information over block boundaries *)
IF CURRFREEPTR > 1021 THEN
  BEGIN
    WRITEITEMBLOCK(CURRBLOCK);
    CURRBLOCK := CURRBLOCK + 4;
    CURRFREEPTR := 0;
  END;

(* flag the end of file *)
TRIX.ITEMBUF [CURRFREEPTR] := -1;
CURRFREEPTR := CURRFREEPTR + 1;

END; (* codexlines *)

(* code into buffer lines > 1 dot *)
PROCEDURE CODEYLINES;
VAR DONTDO : BOOLEAN;

PROCEDURE CHECKLINES;
VAR BITSOFF,Y1 : INTEGER;
BEGIN

```

```

(* save information only if more than one dot *)
IF DOTCOUNT < 2 THEN
  DONTDO := TRUE
ELSE
  BEGIN
    (* skip all pixels already set by x lines *)
    (* checking from bottom to top *)
    DONE := FALSE;
    Y1 := Y0;
    REPEAT
      IF (DOTBUFF(X0,Y1)) THEN
        DONE := TRUE
      ELSE
        Y1 := Y1 + 1;
    UNTIL (Y1 >= (Y0 + DOTCOUNT)) OR (DONE);

    IF Y1 >= (Y0 + DOTCOUNT) THEN
      DONTDO := TRUE
    ELSE
      BEGIN
        (* set the new dot count *)
        DOTCOUNT := DOTCOUNT - (Y1 - Y0);

        (* dont do if only one dot *)
        IF DOTCOUNT < 2 THEN
          DONTDO := TRUE
        ELSE
          BEGIN
            (* save y marker for move to location *)
            Y0 := Y1;

            (* now look for dots already set by x lines from *)
            (* top to bottom of column *)
            Y1 := Y0 + DOTCOUNT - 1;
            REPEAT
              IF (DOTBUFF(X0,Y1)) THEN
                DONE := TRUE
              ELSE
                Y1 := Y1 - 1;
            UNTIL (Y1 <= Y0) OR (DONE);

            IF Y1 <= Y0 THEN
              DONTDO := TRUE
            ELSE
              BEGIN
                DOTCOUNT := (Y1 - Y0) + 1;

                (* check the ration of bits already on to bits off *)
                (* and draw line if bits off * 6 > # of bits to draw *)
                BITSOFF := 0;
                FOR Y1 := Y0 TO (Y0 + DOTCOUNT - 1) DO
                  IF DOTBUFF(X0,Y1) THEN
                    BITSOFF := BITSOFF + 1;
                  IF (BITSOFF * 6) < DOTCOUNT THEN
                    DONTDO := TRUE;

                END;
              END;
            END;
          END;
        END;
      END;
    END;
  END;
  (* checklines *)
END;

BEGIN
  PENCOLOR(WHITE);
  FILLCOLOR(BLACK);
  GOTOXY(0,21);
  GWRITESTR('Coding vertical lines

```

');

```

PENCOLOR(BLACK);
FILLCOLOR(WHITE);

(* start at line zero of screen *)
X := LSET;
REPEAT

  (* point to first pixel on line *)
  Y := BSET;

  REPEAT

    (* look for white space *)
    DONE := FALSE;
    REPEAT
      IF NOT (GBUFFER(X,Y)) THEN
        Y := Y + 1
      ELSE
        DONE := TRUE;
    UNTIL (Y > TSET) OR (DONE);

    (* if the whole line was not blank *)
    IF Y <= TSET THEN
      BEGIN

        (* save location to move to when decoding *)
        X0 := X;
        Y0 := Y;

        (* find out how many consecutive black dots *)
        DOTCOUNT := 0;
        DONE := FALSE;
        REPEAT
          DOTCOUNT := DOTCOUNT + 1;
          Y := Y + 1;
          IF Y > TSET THEN
            DONE := TRUE
          ELSE
            IF NOT GBUFFER(X,Y) THEN
              DONE := TRUE;
        UNTIL DONE;

        DONTDO := FALSE;
        CHECKLINES;

        IF NOT DONTDO THEN
          BEGIN

            FOR I := 0 TO (DOTCOUNT-1) DO
              BEGIN
                DOTAT(X0,Y0 + I);

                (* erase dots in buffer which will be drawn by line *)
                DOTBUFF(X0,Y0 + I) := FALSE;
              END;

            (* dont separate information over block boundaries *)
            IF CURRFREEPTR > 1021 THEN
              BEGIN
                WRITEITEMBLOCK(CURRBLOCK);
                CURRBLOCK := CURRBLOCK + 4;
                CURRFREEPTR := 0;
              END;

            TRIX.ITEMBUF(CURRFREEPTR) := X0;
            TRIX.ITEMBUF(CURRFREEPTR + 1) := Y0;
            TRIX.ITEMBUF(CURRFREEPTR + 2) := (DOTCOUNT - 1);
            CURRFREEPTR := CURRFREEPTR + 3;
          END;
        END;

      UNTIL Y > TSET;

```

```

    (* point to next line *)
    X := X + 1;

    (* until all lines looked at *)
    UNTIL X > RSET;

    (* dont separate information over block boundaries *)
    IF CURRFREEPTR > 1021 THEN
    BEGIN
        WRITEITEMBLOCK(CURRBLOCK);
        CURRBLOCK := CURRBLOCK + 4;
        CURRFREEPTR := 0;
    END;

    (* flag the end of file *)
    TRIX.ITEMBUF(CURRFREEPTR) := -1;
    CURRFREEPTR := CURRFREEPTR + 1;

END;    (* codeylines *)

(* code dots and diagonals *)
PROCEDURE CODEDIAGONALS;
VAR DOTCNT,
    XX,YY,
    X0,XF,
    Y0,YF : INTEGER;
    NOMOREDOTS,
    ZAPDOT : BOOLEAN;

    (* check diagonals through quadrants 1 and 3 *)
    PROCEDURE CHECK13;
    BEGIN
        ZAPDOT := FALSE;
        XX := X;
        YY := Y;
        DOTCNT := 0;
        NOMOREDOTS := FALSE;
        REPEAT
            IF DOTBUFF(DX,YY) THEN
            BEGIN
                XF := XX;
                YF := YY;
                XX := XX + 1;
                YY := YY + 1;
                DOTCNT := DOTCNT + 1;
            END
            ELSE
                NOMOREDOTS := TRUE;
        UNTIL (NOMOREDOTS) OR (XX > RSET) OR (YY > TSET);

        IF DOTCNT > 2 THEN
        BEGIN
            (* dont separate information over block boundaries *)
            IF CURRFREEPTR > 1020 THEN
            BEGIN
                WRITEITEMBLOCK(CURRBLOCK);
                CURRBLOCK := CURRBLOCK + 4;
                CURRFREEPTR := 0;
            END;

            TRIX.ITEMBUF(CURRFREEPTR) := X;
            TRIX.ITEMBUF(CURRFREEPTR + 1) := Y;
            TRIX.ITEMBUF(CURRFREEPTR + 2) := XF;
            TRIX.ITEMBUF(CURRFREEPTR + 3) := YF;
            CURRFREEPTR := CURRFREEPTR + 4;

            X0 := X;
            Y0 := Y;

```

```

REPEAT
  DOTAT(X0,Y0);
  DOTBUFF(X0,Y0) := FALSE;
  X0 := X0 + 1;
  Y0 := Y0 + 1;
UNTIL X0 > XF;

ZAPDOT := TRUE;
END;
END; (* check13 *)

(* check diagonals through quadrants 2 and 4 *)
PROCEDURE CHECK24;
BEGIN
  DOTBUFF(X,Y) := TRUE;
  XX := X;
  YY := Y;
  DOTCNT := 0;
  NOMOREDOTS := FALSE;
  REPEAT
    IF DOTBUFF(XX,YY) THEN
      BEGIN
        XF := XX;
        YF := YY;
        XX := XX + 1;
        YY := YY - 1;
        DOTCNT := DOTCNT + 1;
      END
    ELSE
      NOMOREDOTS := TRUE;
  UNTIL (NOMOREDOTS) OR (XX > RSET) OR (YY < BSET);

  IF DOTCNT > 3 THEN
    BEGIN
      (* dont separate information over block boundaries *)
      IF CURRFREEPTR > 1020 THEN
        BEGIN
          WRITEITEMBLOCK(CURRBLOCK);
          CURRBLOCK := CURRBLOCK + 4;
          CURRFREEPTR := 0;
        END;

        TRIX.ITEMBUF(CURRFREEPTR) := X;
        TRIX.ITEMBUF(CURRFREEPTR + 1) := Y;
        TRIX.ITEMBUF(CURRFREEPTR + 2) := XF;
        TRIX.ITEMBUF(CURRFREEPTR + 3) := YF;
        CURRFREEPTR := CURRFREEPTR + 4;

        X0 := X;
        Y0 := Y;
        REPEAT;
          DOTAT(X0,Y0);
          DOTBUFF(X0,Y0) := FALSE;
          X0 := X0 + 1;
          Y0 := Y0 - 1;
        UNTIL X0 > XF;

      END;

      IF ZAPDOT THEN
        DOTBUFF(X,Y) := FALSE;

    END;
  END; (* check24 *)

BEGIN (* codediagonals *)
  PENCOLOR(WHITE);
  FILLCOLOR(BLACK);

```

```

GGOTOXY(0,21);
GWRITESTR('Coding diagonal lines');
FILLCOLOR(WHITE);
PENCOLOR(BLACK);

ZAPDOT := FALSE;

FOR X := LSET TO RSET DO
  FOR Y := BSET TO TSET DO
    BEGIN
      IF DOTBUFF(X,Y) THEN
        BEGIN
          CHECK13;
          CHECK24;
        END;
      END;
    END;

  (* dont separate information over block boundaries *)
  IF CURRFREEPTR > 1020 THEN
    BEGIN
      WRITEITEMBLOCK(CURRBLOCK);
      CURRBLOCK := CURRBLOCK + 4;
      CURRFREEPTR := 0;
    END;

    (* flag the end of file *)
    TRIX.ITEMBUF(CURRFREEPTR) := -1;
    CURRFREEPTR := CURRFREEPTR + 1;
  END; (* code diagonals *)

BEGIN (* codescreen *)

  CURRBLOCK := 0;
  CURRFREEPTR := 0;

  PENCOLOR(BLACK);

  CODEXLINES;
  CODEYLINES;
  CODEDIAGONALS;

  FILLCOLOR(BLACK);
  PENCOLOR(WHITE);
  GGOTOXY(0,21);
  GWRITESTR('Coding dots');
  FILLCOLOR(WHITE);
  PENCOLOR(BLACK);

  (* code the rest of the dots *)
  FOR X := LSET TO RSET DO
    FOR Y := BSET TO TSET DO
      BEGIN
        IF DOTBUFF(X,Y) THEN
          BEGIN
            (* dont separate information over block boundaries *)
            IF CURRFREEPTR > 1022 THEN
              BEGIN
                WRITEITEMBLOCK(CURRBLOCK);
                CURRBLOCK := CURRBLOCK + 4;
                CURRFREEPTR := 0;
              END;

              TRIX.ITEMBUF(CURRFREEPTR) := X;
              TRIX.ITEMBUF(CURRFREEPTR + 1) := Y;
              CURRFREEPTR := CURRFREEPTR + 2;
              DOTAT(X,Y);
            END;
          END;
        END;
      END;
    END;
  END;

```

```

(* dont separate information over block boundaries *)
IF CURRFREEPTR > 1022 THEN
BEGIN
  WRITEITEMBLOCK(CURRBLOCK);
  CURRBLOCK := CURRBLOCK + 4;
  CURRFREEPTR := 0;
END;

(* flag the end of file *)
TRIX.ITEMBUF(CURRFREEPTR) := -1;

CURRFREEPTR := CURRFREEPTR + 1;

(* adjust pointer for ascii buffer *)
CURRFREEPTR := CURRFREEPTR * 2;

(* dont separate information over block boundaries *)
IF CURRFREEPTR > 2047 THEN
BEGIN
  WRITEITEMBLOCK(CURRBLOCK);
  CURRBLOCK := CURRBLOCK + 4;
  CURRFREEPTR := 0;
END;
END; (* codescreen *)

(* codes the screen array into compact block buffer and writes it to disk. *)
SEGMENT PROCEDURE CODETEXT;
VAR X0,
    CHARCODE,X,Y,I,
    BLOCK,
    BYTE,
    BYTECOUNT : INTEGER;
DONE : BOOLEAN;

    (.....)

    (* fill buffer with ascii & codes, write to disk *)
    PROCEDURE FILLITEMBUFFER(BUFFCODE : INTEGER);
    BEGIN
      TRIX.ASCIIBUF(CURRFREEPTR) := BUFFCODE;
      CURRFREEPTR := CURRFREEPTR + 1;
      IF CURRFREEPTR = 2048 THEN
        BEGIN (1)
          WRITEITEMBLOCK(CURRBLOCK);
          CURRBLOCK := CURRBLOCK + 4;
          CURRFREEPTR := 0;
        END; (1)
      END; (* fillitembuffer *)
    (.....)

BEGIN (* codescreen *)

  (* display message *)
  TEXTON;
  WRITE(CHR(28));
  GOTOXY(1,1);
  WRITE('Entering text');

  (* start at line 0 of screen buffer *)
  Y := 0;
  REPEAT

    (* point to first character on line *)
    X := 0;
    WRITE(' ');

    (* look for leading blanks *)
    DONE := FALSE;
    REPEAT

```

```

IF SCREEN(X,Y) = CHR(SPACE)
THEN
  X := X + 1
ELSE
  DONE := TRUE;
UNTIL (X > XSCREEN) OR (DONE);

(* if the whole line was not blank *)
IF X <= XSCREEN THEN
BEGIN (1)

  (* flag a gotoxy where first non-blank character begins *)
  FILLITEMBUFFER(GOTOFLAG);
  FILLITEMBUFFER(X);
  FILLITEMBUFFER(Y);
  BYTECOUNT := 0;

  (* figure out how many bytes on this line *)
  X0 := X;

  REPEAT
    I := X0;
    DONE := FALSE;

    REPEAT
      IF SCREEN(I,Y) = CHR(SPACE)
      THEN
        I := I + 1
      ELSE
        DONE := TRUE;
    UNTIL (I > XSCREEN) OR (DONE);

    IF I < XSCREEN THEN
      BEGIN (2)
        BYTECOUNT := BYTECOUNT + 1;
        X0 := X0 + 1;
        DONE := FALSE;
      END (2)
    ELSE
      DONE := TRUE;
  UNTIL (DONE) OR (X0 > XSCREEN);

  FILLITEMBUFFER(BYTECOUNT);

  REPEAT

    (* look for trailing blanks *)
    I := X;
    DONE := FALSE;

    REPEAT
      IF SCREEN(I,Y) = CHR(SPACE)
      THEN
        I := I + 1
      ELSE
        DONE := TRUE;
    UNTIL (I > XSCREEN) OR (DONE);

    (* if the rest of the line was not all blanks *)
    IF I < XSCREEN THEN
      BEGIN (3)

        (* save the character in the block buffer *)
        FILLITEMBUFFER(ORD(SCREEN(X,Y)));

        (* set pointer to next character *)
        X := X + 1;

        (* set loop condition to process next character *)
        DONE := FALSE;
      END (3)
    ELSE

```

```

        (* done with this line, go look at next line in screen buffer *)
        DONE := TRUE;

        (* until done with line or last character in line processed *)
        UNTIL (DONE) OR (X > XSCREEN);
    END; (I)

    (* point to next line *)
    Y := Y + 1;

    (* until all lines looked at *)
    UNTIL Y >= YSCREEN;

    (* flag end of question text *)
    FILLITEMBUFFER(ENDITEM);

    (* write the last block of ascii to file *)
    WRITEITEMBLOCK(CURRBLOCK);

    GRAFIXON;

    END; (* codescreen *)

    -----

    (* fills an array representing the crt with char screen location may be *)
    (* specified this is the guts of the question text editor *)
    SEGMENT PROCEDURE FILLSCREENBUFFER(UPBOUND,RIGHTBOUND,
                                      LOBOUND,LEFTBOUND : INTEGER;
                                      FLUSHBUF : BOOLEAN);

    VAR SCREENCHAR : CHAR;
        CHARACTERS,
        CONTROLCHAR : SETOFCHAR;
        SCREENBYTES,
        CHARCODE,
        X,
        Y,
        L : INTEGER;

    BEGIN

        CHARACTERS := [CHR(32)..CHR(126)];

        (* set # of bytes in screen character buffer *)
        SCREENBYTES := (XSCREEN + 1) * (YSCREEN + 1);

        (* if wish to start with a blank buffer, new text *)
        (* clear screen *)
        FILLCHAR(SCREEN(0),SCREENBYTES,' ');

        (* put cursor in upper left hand corner *)
        X := LEFTBOUND;
        Y := UPBOUND;

        (* dont give multiple page option to graphics *)
        CONTROLCHAR := [CHR(UP),CHR(DOWN),CHR(LARROW),CHR(RARROW),
                        CHR(ETX),CHR(RET)];

        PENCOLOR(WHITE);
        FILLCOLOR(BLACK);
        GOTOXY(0,20);
        FOR L := 1 TO RIGHTBOUND DO
            GWRITECHR('-');
        GOTOXY(1,21);
        GWRITESTR('Enter krunched text. Use arrows to move cursor. ');
        GOTOXY(1,22);
        GWRITESTR('<RET>:next line. ');
        GOTOXY(1,23);
        GWRITESTR('<CTRL>-C to quit and save ');
        PENCOLOR(BLACK);
        FILLCOLOR(WHITE);
    
```

```

(* fill up the screen character buffer until done *)
REPEAT

  (* monitor cursor location *)
  GGOTOXY(X,Y);
  FILLCOLOR(BLACK);
  VIEWPORT(XLOC,XLOC+6,YLOC-7,YLOC);
  FILLPORT;

  (* get a character from the keyboard *)
  SCREENCHAR := GETCHAR(CHARACTERS + CONTROLCHAR,TRUE,TRUE,TRUE);

  (* delete the graphics cursor *)
  FILLCOLOR(WHITE);
  FILLPORT;

  IF NOT (SCREENCHAR IN CHARACTERS) THEN
    GWRITECHR(SCREEN(X,Y));

  (* get the ascii value *)
  CHARCODE := ORD(SCREENCHAR);

  (* check for cursor control characters *)
  CASE CHARCODE OF

    (* cursor moved up but not beyond set boundaries *)
    UP : IF Y <= UPBOUND
      THEN
        SQUAWK
      ELSE
        Y := Y - 1;

    (* cursor moved down but not beyond set boundaries *)
    DOWN : IF Y >= LOBOUND
      THEN
        SQUAWK
      ELSE
        Y := Y + 1;

    (* cursor moved to left with auto wrap around *)
    LARROW : IF X <= LEFTBOUND THEN
      BEGIN (3)
        IF Y <= UPBOUND
          THEN
            SQUAWK
          ELSE
            BEGIN (4)
              X := RIGHTBOUND;
              Y := Y - 1;
            END; (4)
          END (3)
        ELSE
          X := X - 1;

    (* cursor moved to right with auto wraparound *)
    RARROW : IF X >= RIGHTBOUND THEN
      BEGIN (5)
        IF Y >= LOBOUND
          THEN
            SQUAWK
          ELSE
            BEGIN (6)
              Y := Y + 1;
              X := LEFTBOUND;
            END; (6)
          END (5)
        ELSE
          X := X + 1;

    (* carriage return *)
    RET : IF Y >= LOBOUND
      THEN
        SQUAWK

```

```

        ELSE
        BEGIN (7)
            Y := Y + 1;
            X := LEFTBOUND;
        END; (7)

    END; (* cases *)

    (* if character typed was a visible character *)
    IF (CHARCODE >= 32) AND (CHARCODE <= 126) THEN
    BEGIN (10)

        (* if last character exceeded screen boundaries *)
        IF (X > RIGHTBOUND) AND (Y >= LOBOUND)
        THEN
            SQUAWK
        ELSE
        BEGIN (11)

            (* save the character in the screen buffer *)
            SCREEN(X,Y) := SCREENCHAR;

            (* write character to screen if graphics *)
            GWRITECHR(CHR(CHARCODE));

            (* move cursor over one *)
            X := X + 1;

            (* check auto wrap around *)
            IF X > RIGHTBOUND THEN
            BEGIN (12)
                IF Y < LOBOUND THEN
                BEGIN (13)
                    X := LEFTBOUND;
                    Y := Y + 1;
                END (13)
                ELSE
                    X := X - 1;
            END; (12)
        END; (11)
    END; (10)

    (* until control-c pressed *)
    UNTIL CHARCODE = ETX;

    (* restore the viewport *)
    VIEWPORT(0,559,32,191);

    END; (* fillscreenbuffer *)

```

```
(*****)
(* File : G.2SUBRT.TEXT *)
(* Last modified : Feb 28, 1983 *)
(*****)
```

```
(* draws the top border if user wishes to krunch subset of picture *)
SEGMENT PROCEDURE THANDLER;
BEGIN
```

```
(* save the location cursor was at *)
OLDX := XLOC;
OLDY := YLOC;
```

```
(* if cursor location is above the bottom border then it is ok *)
IF YLOC > BSET THEN
BEGIN
```

```
(* erase old top set *)
IF T THEN
BEGIN
FOR I := WEST TO EAST DO
BEGIN
IF TLINE(I) THEN
PENCOLOR(BLACK)
ELSE
PENCOLOR(WHITE);
DOTAT(I,TSET);
END;
END;
```

```
(* draw the new top border and flag that border has been set *)
T := TRUE;
PENCOLOR(BLACK);
PREVBLACK := TRUE;
TSET := OLDY;
FOR I := WEST TO EAST DO
BEGIN
MOVETO(I,TSET);
```

```
(* save the original screenline where border overwrites it *)
IF XYCOLOR = 8 THEN
TLINE(I) := TRUE
ELSE
TLINE(I) := FALSE;

IF (I >= LSET) AND (I <= RSET) THEN
DOTAT(I,TSET);
END;
```

```
(* erase where original cursor was *)
TLINE(OLDX) := FALSE;
```

```
(* if the left border was set, adjust it so it meets with top border *)
IF L THEN
BEGIN
MOVETO(LSET,SOUTH);
PENCOLOR(WHITE);
LINETO(LSET,BSET);
PENCOLOR(BLACK);
LINETO(LSET,TSET);
PENCOLOR(WHITE);
LINETO(LSET,NORTH);
END;
```

```
(* if the right border was set, adjust it *)
IF R THEN
BEGIN
MOVETO(RSET,SOUTH);
PENCOLOR(WHITE);
LINETO(RSET,BSET);
PENCOLOR(BLACK);
```

```

    LINETO(RSET,TSET);
    PENCOLOR(WHITE);
    LINETO(RSET,NORTH);
END;

(* restore cursor to original location *)
PENCOLOR(BLACK);
MOVETO(OLDX,OLDY);

END;
END; (* thandler *)

(* set the bottom border of area of graphics screen to compress *)
SEGMENT PROCEDURE BHANDLER;
BEGIN
    (* save current cursor location *)
    OLDX := XLOC;
    OLDY := YLOC;

    (* if cursor is below the top border then ok *)
    IF YLOC < TSET THEN
    BEGIN
        (* erase old bottom set if previously set *)
        IF B THEN
        BEGIN
            (* restore what screen was before *)
            FOR I := WEST TO EAST DO
            BEGIN
                IF BLINE(I) THEN
                    PENCOLOR(BLACK)
                ELSE
                    PENCOLOR(WHITE);
                DOTAT(I,BSET);
            END;
        END;

        B := TRUE; (* flag that bottom was set *)

        (* draw new bottom border while saving original screen *)
        PREVBLACK := TRUE;
        PENCOLOR(BLACK);
        BSET := OLDY;
        FOR I := WEST TO EAST DO
        BEGIN
            MOVETO(I,BSET);
            IF XYCOLOR = 0 THEN
                BLINE(I) := TRUE
            ELSE
                BLINE(I) := FALSE;

            IF (I >= LSET) AND (I <= RSET) THEN
                DOTAT(I,BSET);
        END;
        BLINE(OLDX) := FALSE;

        (* adjust bottom border if left or right borders were set *)
        IF L THEN
        BEGIN
            MOVETO(LSET,SOUTH);
            PENCOLOR(WHITE);
            LINETO(LSET,BSET);
            PENCOLOR(BLACK);
            LINETO(LSET,TSET);
            PENCOLOR(WHITE);
            LINETO(LSET,NORTH);
        END;

        (* if right border was set *)
        IF R THEN
        BEGIN
            MOVETO(RSET,SOUTH);

```

```

    PENCOLOR(WHITE);
    LINETO(RSET,BSET);
    PENCOLOR(BLACK);
    LINETO(RSET,TSET);
    PENCOLOR(WHITE);
    LINETO(RSET,NORTH);
END;

    PENCOLOR(BLACK);
    MOVETO(OLDX,OLDY);
END;
END; (* bhandler *)

(* set the left border of area to compress *)
SEGMENT PROCEDURE LHANDLER;
BEGIN

    (* save old cursor locations *)
    OLDX := XLOC;
    OLDY := YLOC;

    (* if current position is to the left of the right border then ok *)
    IF XLOC < RSET THEN
    BEGIN
        (* erase old left set *)
        IF L THEN
        BEGIN
            FOR I := SOUTH TO NORTH DO
            BEGIN
                IF LLINE(I) THEN
                    PENCOLOR(BLACK)
                ELSE
                    PENCOLOR(WHITE);
                DOTAT(LSET,I);
            END;
        END;

        (* draw the new border *)
        L := TRUE;
        PREVBLACK := TRUE;
        PENCOLOR(BLACK);
        LSET := OLDX;
        FOR I := SOUTH TO NORTH DO
        BEGIN
            MOVETO(LSET,I);
            IF XYCOLOR = 0 THEN
                LLINE(I) := TRUE
            ELSE
                LLINE(I) := FALSE;

            IF (I >= BSET) AND (I <= TSET) THEN
                DOTAT(LSET,I);
        END;
        LLINE(OLDY) := FALSE;

        (* adjust border if top or bottom was set *)
        IF T THEN
        BEGIN
            MOVETO(WEST,TSET);
            PENCOLOR(WHITE);
            LINETO(LSET,TSET);
            PENCOLOR(BLACK);
            LINETO(RSET,TSET);
            PENCOLOR(WHITE);
            LINETO(EAST,TSET);
        END;

        IF B THEN
        BEGIN
            MOVETO(WEST,BSET);
            PENCOLOR(WHITE);

```

```

    LINETO(LSET,BSET);
    PENCOLOR(BLACK);
    LINETO(RSET,BSET);
    PENCOLOR(WHITE);
    LINETO(EAST,BSET);
END;
PENCOLOR(BLACK);
MOVETO(OLDX,OLDY);
END;

END; (* handler *)

(* set the right border of area to be compressed *)
SEGMENT PROCEDURE RHANDLER;
BEGIN
    OLDX := XLOC;
    OLDY := YLOC;
    IF XLOC > LSET THEN
    BEGIN
        (* erase old right *)
        IF R THEN
        BEGIN
            FOR I := SOUTH TO NORTH DO
            BEGIN
                IF RLINE(I) THEN
                    PENCOLOR(BLACK)
                ELSE
                    PENCOLOR(WHITE);
                DOTAT(RSET,I);
            END;
        END;

        R := TRUE;
        PENCOLOR(BLACK);
        PREVBBLACK := TRUE;
        RSET := OLDX;
        FOR I := SOUTH TO NORTH DO
        BEGIN
            MOVETO(RSET,I);
            IF XYCOLOR = 0 THEN
                RLINE(I) := TRUE
            ELSE
                RLINE(I) := FALSE;

            IF (I >= BSET) AND (I <= TSET) THEN
                DOTAT(RSET,I);
        END;
        RLINE(OLDY) := FALSE;

        IF T THEN
        BEGIN
            MOVETO(WEST,TSET);
            PENCOLOR(WHITE);
            LINETO(LSET,TSET);
            PENCOLOR(BLACK);
            LINETO(RSET,TSET);
            PENCOLOR(WHITE);
            LINETO(EAST,TSET);
        END;

        IF B THEN
        BEGIN
            MOVETO(WEST,BSET);
            PENCOLOR(WHITE);
            LINETO(LSET,BSET);
            PENCOLOR(BLACK);
            LINETO(RSET,BSET);
            PENCOLOR(WHITE);
            LINETO(EAST,BSET);
        END;
        PENCOLOR(BLACK);
    
```

```

MOVETO(OLDX,OLDY);
END;
END; (* rhandler *)

```

```

(* krunch a fotofile *)
SEGMENT PROCEDURE KRUNCH;
VAR AGAIN : CHAR;

```

```

(* get the filename to be compressed *)
SEGMENT PROCEDURE GETCFIL;
VAR QNAME : STRING;
    SELECT : CHAR;

```

```

PROCEDURE CHECKIT;
BEGIN
  (*$!-$*)
  RESET(GTEXT,DESTNAME);
  (*$!+$*)

  IF IORESULT = 0 THEN
    BEGIN
      WRITELN;
      WRITE('Destroy old ',DESTNAME,' ? Y/N : ');
      IF GETCHAR(['Y','N','y','n'],TRUE,TRUE,TRUE) IN ['Y','y'] THEN
        BEGIN
          CLOSE(GTEXT,PURGE);
          REWRITE(GTEXT,DESTNAME);
        END
      ELSE
        BEGIN
          CLOSE(GTEXT,NORMAL);
          GRAFIXON;
          EXIT(KRUNCH);
        END;
      END;
    END
  ELSE
    BEGIN
      (*$!-$*)
      REWRITE(GTEXT,DESTNAME);
      (*$!+$*)

      IF IORESULT <> 0 THEN
        BEGIN
          WRITELN;
          WRITE('Cannot open ',DESTNAME,' Press <RET> ');
          IF GETCHAR([CHR(RET)],TRUE,TRUE,TRUE) = CHR(RET) THEN
            BEGIN
              GRAFIXON;
              EXIT(KRUNCH);
            END;
          END;
        END;
      END;
    END;
  END; (* checkit *)

```

```

BEGIN
  IF PREVTRAVEL THEN      (* eliminate travel dot *)
    BEGIN
      PENCOLOR(WHITE);
      DOTAT(XLOC,YLOC);
      PENCOLOR(BLACK);
    END;

  TEXTON;
  GOTOXY(0,0);
  WRITE(CHR(28));
  GOTOXY(18,0);
  WRITE('KRUNCH GRAPHICS MENU');
  GOTOXY(0,4);

```

```

WRITE('Select one of the following options by entering its number. ');
GOTOXY(16,8);
WRITE('1. QUIT');
GOTOXY(16,9);
WRITE('2. KRUNCH AS SUBTEST QUESTION');
GOTOXY(16,10);
WRITE('3. KRUNCH AS SUBTEST SAMPLE QUESTION');
GOTOXY(16,11);
WRITE('4. KRUNCH TO SPECIFIED FILENAME');
GOTOXY(16,15);
WRITE('Enter Choice # : ');
SELECT := GETCHAR(['1'..'4'],TRUE,TRUE,TRUE);
CASE SELECT OF
  '1' : BEGIN
    PAGE(OUTPUT);
    GRAFIXON;
    EXIT(KRUNCH);
  END;
  '2' : BEGIN
    PAGE(OUTPUT);
    WRITE('Enter the itemcode : ');
    READLN(QNAME);
    DESTNAME := CONCAT('/CATFOTO/',SUBTESTCHAR,'DIR/G',SUBTEST_CHAR,
      QNAME,'.DATA');
  END;
  '3' : BEGIN
    PAGE(OUTPUT);
    WRITE('Krunch as which sample question? <1..5> : ');
    SELECT := GETCHAR(['1'..'5'],TRUE,TRUE,TRUE);
    QNAME := ' ';
    QNAME[1] := SELECT;
    DESTNAME := CONCAT('/CATFOTO/',SUBTESTCHAR,'DIR/G',SUBTEST_CHAR,
      'SQ',QNAME,'.DATA');
  END;
  '4' : BEGIN
    PAGE(OUTPUT);
    WRITELN('Enter the filename you wish to krunch graphics to. ');
    WRITELN('You may specify a volume. ');
    WRITELN;
    WRITE('Enter filename : ');
    READLN(DESTNAME);
    IF POS('.DATA',DESTNAME) = 0 THEN
      DESTNAME := CONCAT(DESTNAME,'.DATA');
    END;
  END;
END;

CHECKIT;

CLOSE(GTEXT,LOCK);
END; (* getname *)

```

BEGIN (\* compress \*)

```

PREVBLACK := FALSE;
PREVTRAVEL := FALSE;
T := FALSE;
B := FALSE;
R := FALSE;
L := FALSE;
TSET := NORTH;
BSET := SOUTH;
LSET := WEST;
RSET := EAST;

```

```

(* get a destination file for the compressed graphics *)
GETCFIL;

```

```

WRITEITEMBLOCK(0);
GRAFIXON;

```

```

CLEARBOTTOM;
GGOTOXY(26,20);
GWRITESTR('SET KRUNCH BORDERS');
FILLCOLOR(BLACK);
PENCOLOR(WHITE);
GGOTOXY(0,21);
GWRITESTR(
'T)op           B)ottom           L)eft           R)ight');
GGOTOXY(0,22);
GWRITESTR(
'F)ast cursor   N)ormal cursor');
GGOTOXY(0,23);
GWRITESTR(
'<arrows move cursor>      <cntrl>-C to accept');

MOVETO(0,SOUTH);
REPEAT

  CH := GETCHAR(['F','N','T','B','L','R',
                'f','n','t','b','l','r',
                CHR(LARROW),CHR(RARROW),CHR(UP),CHR(DOWN),
                CHR(ETX)],TRUE,FALSE,TRUE);

  CASE CH OF

    (* set area to be compressed options *)
    'T','t' : THANDLER;
    'B','b' : BHANDLER;
    'L','l' : LHANDLER;
    'R','r' : RHANDLER;
    'F','f' : FASTCURSOR := TRUE;
    'N','n' : FASTCURSOR := FALSE;

    OTHERWISE

      (* just moves cursor, doesnt erase anything *)
      IF (CH = CHR(8)) THEN
        TRAVEL('X',-1)
      ELSE
        IF (CH = CHR(21)) THEN
          TRAVEL('X', 1)
        ELSE
          IF (CH = CHR(11)) THEN
            TRAVEL('Y', 1)
          ELSE
            IF (CH = CHR(10)) THEN
              TRAVEL('Y',-1);
            END;
          END;
        END;
      END;

    UNTIL ORD(CH) = ETX;

    PENCOLOR(BLACK);
    FILLCOLOR(WHITE);

    (* signal that crunching has begun *)
    CLEARBOTTOM;
    FILLCOLOR(BLACK);
    PENCOLOR(WHITE);
    GGOTOXY(0,21);
    GWRITESTR(
      Krunching Fotofile');
    PENCOLOR(BLACK);
    FILLCOLOR(WHITE);

    (* adjust the boundaries of area set by user to get all that is inside *)
    LSET := LSET + 1;
    TSET := TSET - 1;
    RSET := RSET - 1;
    BSET := BSET + 1;

    (* fill up dot buffer of what is exactly on the screen *)
    PENCOLOR(WHITE);
  
```

```

FOR X := LSET TO RSET DO
BEGIN
  FOR Y := BSET TO TSET DO
  BEGIN
    MOVETO(X,Y);
    GBUFFER(X,Y) := (XYCOLOR = 0);
    DOTAT(X,Y);
  END;
END;
DOTBUFF := GBUFFER;

(* crunch the screen into new format *)
CODESCREEN;

(* signal crunching is done , give main menu back *)
VIEWPORT(LSET,RSET,BSET,TSET);
FILLCOLOR(BLACK);
CLEARBOTTOM;
PENCOLOR(WHITE);
FILLCOLOR(BLACK);
GGOTOXY(0,21);
GWRITESTR('Krunching is completed. Press <RET> to continue ');
READLN;
PENCOLOR(BLACK);
FILLCOLOR(BLACK);
CLEARBOTTOM;
FILLSCREENBUFFER(0,78,20,0,TRUE);
CODETEXT;

DECODEGRAF;
CLEARBOTTOM;
GGOTOXY(0,20);
FILLCOLOR(BLACK);
PENCOLOR(WHITE);
GWRITESTR('Press <RET> to continue. ');
FILLCOLOR(WHITE);
PENCOLOR(BLACK);
READLN;

texton;
write(chr(28));
elapsed := starttime - endtime;
if elapsed < 0 then
  elapsed := - elapsed;

gotoxy(0,0);
writeln('Time : ',elapsed,' seconds');
writeln;
write('Press <RET>');
if getchar([chr(ret)],true,true,true) = chr(ret) then
  grafixon;

MAINMENU;
END; (* compress *)

```

```

(* lists the tests in directory & loads *)
SEGMENT PROCEDURE LOADTEST(MESSAGE : STRING);
VAR Q,
    TESTNUM,
    RECNUM : INTEGER;
    OKTEST : BOOLEAN;
    TEXTCODE : CHAR;

(* lists the directory test names to the screen *)
PROCEDURE LISTTESTS;
VAR I,J,K,ITEMCOUNT : INTEGER;
BEGIN
  PAGE(OUTPUT);
  GOTOXY(16,0);

```

```

WRITE('GRAPHICS MANAGER LIST OF SUBTESTS ',VERSION);
I := 0;
J := 0;
GOTOXY(0,3);
REPEAT
  IF NOT (DIRINFO[I].NOTUSED) THEN
    BEGIN
      J := J + 1;
      IF J <= 10 THEN
        GOTOXY(0,2+J)
      ELSE
        GOTOXY(40,2+J-10);
      WRITE(J,' ',DIRINFO[I].TNAME);
    END;
    I := I + 1;
  UNTIL I > MAXSUBTESTS;
END; (* listtests *)

BEGIN (* loadtest *)
  TEXTON;
  OKTEST := FALSE;
  LISTTESTS;
  RESET(FILEDIRECTORY,INDEXNAME);
  REPEAT
    GOTOXY(0,15);
    WRITELN(
      'INSTRUCTIONS : Enter choice #, then press <RET>.';
    WRITE(
      'To escape, press 0 then <RET>.';
    GOTOXY(0,18);
    WRITE(MESSAGE);
    (*$!-*)
    READLN(TESTNUM);
    (*$!+*)
    IF TESTNUM = 0 THEN
      BEGIN
        ESCPROC := TRUE;
        CLOSE(FILEDIRECTORY,LOCK);
        EXIT(LOADTEST);
      END;
    IF (TESTNUM < 0) OR (TESTNUM > (MAXSUBTESTS+1)) THEN
      BEGIN
        WRITELN;
        WRITELN('Invalid test # : ',TESTNUM);
        SQUAWK;
        WRITELN;
        STALL;
      END
    ELSE
      BEGIN
        RECNUM := 0;
        Q := 0;
        REPEAT
          SEEK(FILEDIRECTORY,RECNUM);
          GET(FILEDIRECTORY);
          IF NOT (FILEDIRECTORY^.UNUSED) THEN
            Q := Q + 1;
            RECNUM := RECNUM + 1;
          UNTIL (Q = TESTNUM) OR (RECNUM > MAXSUBTESTS);
          IF Q = TESTNUM THEN
            BEGIN
              CURRINDEXRECNUM := RECNUM - 1;
              OKTEST := TRUE;
            END
          ELSE
            BEGIN
              WRITELN;
              WRITELN('No test loaded');
              WRITELN;
              STALL;
            END;
          END;
        END;
      END;
    END;
  END;

```

```
    IF NOT OKTEST THEN BLANKLINES(18,6,18);  
    UNTIL OKTEST;  
    SEEK(FILEDIRECTORY,CURRINDEXRECNUM);  
    GET(FILEDIRECTORY);  
    DIRECTORY := FILEDIRECTORY^;  
    CLOSE(FILEDIRECTORY,LOCK);  
    WRITE(CHR(28));  
END;
```

**DMGR.DIR:**  
**Subdirectory - CAT diagnostic Program**



```
(*****
*)
*)      Textfile : D.MGR.TEXT          Volume : TFILES      *)
*)      Codefile : D.MGR.CODE         Volume : CATDATA      *)
*)
*)
*)      File last modified : Mar 11, 1983      NPROC      *)
*)
*)      This program is a diagnostic procedure to look for possible bugs in *)
*)      the cat system files. It checks all the infotables to see that the items *)
*)      exist in the database, and it also checks that all questions which have *)
*)      the graphics flag set indeed have a graphics foto on the volume Catfoto. *)
*)      Another option is a duplicate question search procedure which scans a *)
*)      specified subtest, and checks the question text to see if questions are *)
*)      similar or duplicate. *)
*)      Other diagnostics will be added as needed. *)
*)
*)
*)*****
```

```
(**S**)
PROGRAM DIAGNOSTIC;
USES CHAINSTUFF; (* allows to get back to catproject *)
```

```
CONST (* ascii values *)
  ETX = 3; (* cntrl-c *)
  BELL = 7;
  NUL = 0;
  LARROW = 8;
  RARROW = 21;
  RET = 13;
  UP = 11;
  DOWN = 10;
  ESC = 27;
  SPACE = 32;
  ASCIIOFFSET = 48; (* ascii zero *)
  MAXLINEBUF = 79; (* string buffer size *)

  (* test directory name *)
  INDEXNAME = 'CATDATA:TESTINDEX.DATA'; (* test directory *)
  DATANAME = 'CATDATA:ITEMPOOL.DATA'; (* Question directory *)
  TEXTNAME = 'QTEXT:ITEMTEXT.DATA'; (* Question ascii text *)

  (* slots available in directory *)
  MAXSUBTESTS = 20;

  (* maximum question pool per test *)
  MAXITEMPOOL = 300;

  (* maximum # of sample questions *)
  MAXSAMPLES = 5;

  UNITNUMPRINTER = 'PRINTER:';

  DEFAULTFILE = 'DIAGNOSTIC.TEXT';

  VERSION = '[1.03]';

  TABNAME = 'CATDATA:TABINFO.DATA';

  (* information table dimensions *)
  INFOROW = 36;
  INFOCOLUMN = 20;

  TYPE DIRDATA = PACKED RECORD (* directory for tests *)
    UNUSED : BOOLEAN;
    TESTNAME : STRING;
    ITEMCODE : PACKED ARRAY
      [0..MAXITEMPOOL]
      OF INTEGER;
  END;
```

```

(* info table *)
TABLE = ARRAY[1..INFOCOLUMN,1..INFOROW] OF INTEGER;

(* type of question response *)
SEVENTYPE = PACKED ARRAY[1..7] OF CHAR;

(* Different types of ways to answer a question *)
ITEMRESPONSES = (CHARVALUE,      (* normal multiple choice *)
                 INTVALUE,       (* Integer value as answer *)
                 SEVENCHR);      (* seven characters saved as answer *)

(* question ptrs/data , information for each question *)
ITEMDATA = PACKED RECORD

    (* flags if graphics item *)
    GRAPHICS : BOOLEAN;

    (* valid response ranges for multiple choice *)
    LOWANSWER,
    HIGHANSWER : CHAR;

    (* block # in file where text starts *)
    ITEMBLOCK,

    (* byte # in block where text starts *)
    ITEMPTR,

    (* # of answers if multiple question screen *)
    ANSWERCOUNT : INTEGER;

    (* information parameters for bayesian strategy *)
    A,B,C,

    (* currently unused *)
    PROPCORRECT,
    POINTBISERIAL,
    YOPT,
    XOPT,
    DUMMY1, (* used to flag compressed graphics if 1.0 *)
    DUMMY2,
    DUMMY3 : REAL;

    (* correct answer to question *)
    CASE ATYPE : ITEMRESPONSES OF
        CHARVALUE : (ANSWER : CHAR);
        INTVALUE : (INTANSWER : INTEGER);
        SEVENCHR : (CHRANSWER : SEVENTYPE);
    END;

SETOFCHAR = SET OF CHAR;

VAR LETTERS,DIGITS,CHARACTERS : SET OF CHAR;
    output,
    COMMAND : CHAR;

ESCPROC : BOOLEAN; (* true ==> leave duplicate question search *)

(* string character buffer *)
LINEBUF : PACKED ARRAY[0..MAXLINEBUF] OF CHAR;

CURRINDEXRECNUM : INTEGER; (* record # of file directory *)

(* test directory *)
DIRECTORY : DIRDATA;
FILEDIRECTORY : FILE OF DIRDATA;

(* test question ptrs/data *)
ITEMINFO : ITEMDATA;
FILEITEMINFO : FILE OF ITEMDATA;

(* infotable *)
INFOTABLE : TABLE;
INFOFILE : FILE OF TABLE;

```

```

(* question ascii file *)
ITEMTEXT : FILE;

(* output file for test listings *)
OUTFILE,
DEST : TEXT;

PROCEDURE PAGE(DUMMY : CHAR); FORWARD;
PROCEDURE SQUAWK; FORWARD;
PROCEDURE BLANKLINES(START,COUNT,ENDCURSOR : INTEGER); FORWARD;
FUNCTION GETCHAR(OKSET : SETOFCHAR; FORWARD;
                FLUSHQUEUE,ECHO,BEEP : BOOLEAN) : CHAR; FORWARD;
PROCEDURE STALL; FORWARD;
FUNCTION SLOT(CODE : INTEGER) : INTEGER; FORWARD;
PROCEDURE MENU; FORWARD;
PROCEDURE LOADINFO(RECNUM : INTEGER); FORWARD;
FUNCTION HASH(KEY : INTEGER) : INTEGER; FORWARD;
PROCEDURE GETNEWFILE; FORWARD;
PROCEDURE LOADTEST(MESSAGE : STRING); FORWARD;

(*$! /FILES/DMGR.DIR/D.SEARCH.TEXT *) (* looks for duplicate questions *)
(*$! /FILES/DMGR.DIR/D.INFOTAB.TEXT *) (* check the infotables *)
(*$! /FILES/DMGR.DIR/D.GRAFIX.TEXT *) (* check the grafix files *)
(*$! /FILES/DMGR.DIR/D.UTL.TEXT *) (* utilities *)

(* main program *)
BEGIN
  DIGITS := ['0'..'9'];
  LETTERS := ['A'..'Z','a'..'z'];
  CHARACTERS := [CHR(32)..CHR(126)];
  FILLCHAR(LINEBUF[0],MAXLINEBUF,' ');

  REPEAT
    ESCPROC := FALSE;
    MENU;
    COMMAND := GETCHAR(['1'..'4'],TRUE,FALSE,TRUE);
    CASE COMMAND OF
      '1' : ;
      '2' : CHECKINFOTABS;
      '3' : CHECKGFILES;
      '4' : SEARCHTEXT;
    END; (* cases *)
  UNTIL COMMAND = '1';

  PAGE(OUTPUT);
  GOTOXY(18,10);
  WRITE('Loading Catproject driver');
  SETCHAIN('CATDATA:CATPROJECT');
END. (* diagnostic *)

```

```

(*-----*)
(* FILE : D.UTL.TEXT "Include file for D.MGR" *)
(* File last modified : Mar 11, 1983 *)
(*-----*)

(* This procedure is called by most of the other procedures. It clears *)
(* the console screen. *)
PROCEDURE PAGE;
BEGIN
  WRITE(CHR(28));
  GOTOXY(0,0);
END;

(*--- rings the bell ---*)
PROCEDURE SQUAWK;
BEGIN
  WRITE(CHR(BELL));
END; (* squawk *)

(*-----*)

(*--- blank out lines ---*)
PROCEDURE BLANKLINES;
VAR I : INTEGER;
BEGIN
  GOTOXY(0,START);
  FOR I := 1 TO (COUNT-1) DO
    WRITELN(' ' : 39);
  WRITE(' ' : 39);
  GOTOXY(0,ENDCURSOR);
END; (* blanklines *)

(*-----*)

(* read an acceptable character from the keyboard *)
FUNCTION GETCHAR;
VAR MASK : PACKED ARRAY(0..0) OF CHAR;
BEGIN
  IF FLUSHQUEUE THEN UNITCLEAR(2); (* flush buffer *)
  REPEAT
    UNITREAD(2,MASK,1);
    IF BEEP AND NOT (MASK(0) IN OKSET) THEN SQUAWK;

    UNTIL MASK(0) IN OKSET;
    IF ECHO AND (MASK(0) IN [CHR(32)..CHR(126)]) THEN
      WRITE(MASK(0));
    GETCHAR := MASK(0);
  END; (* getchar *)

(*-----*)

(*--- display a message/wait for a keystroke ---*)
PROCEDURE STALL;
VAR STALLCHAR : CHAR;
BEGIN
  WRITE('Press <RET> to continue ');
  STALLCHAR :=
    GETCHAR([CHR(RET),CHR(ESC)],TRUE,FALSE,TRUE);
  IF STALLCHAR = CHR(ESC) THEN EXIT(PROGRAM);
END; (* stall *)

(*-----*)

(* Given a question code, this function returns the location *)
(* of the question's data, & text pointers. *)
(* This function is called by: Procedure ? *)

FUNCTION SLOT;
VAR INDEX : INTEGER;
    FOUND : BOOLEAN;

```

(\* All other variables are global to Program STRATEGY \*)

```
BEGIN (* slot *)
INDEX := MAXSAMPLES + 1;
FOUND := FALSE;

REPEAT
  IF DIRECTORY.ITEMCODE[INDEX] = CODE
  THEN
    FOUND := TRUE
  ELSE
    INDEX := INDEX + 1;
  UNTIL (INDEX > MAXITEMPOOL) OR (FOUND);

  IF FOUND
  THEN
    SLOT := INDEX
  ELSE
    SLOT := -1;
END; (* slot *)
```

(\* ----- \*)

(\* Show command level selections \*)  
 (\* This procedure is called by Program STRATEGY main routine. \*)

```
PROCEDURE MENU;
BEGIN
  PAGE(OUTPUT);
  GOTOXY(20,0);
  WRITE('CAT SYSTEM DIAGNOSTIC MENU ',VERSION);
  GOTOXY(0,4);
  WRITE('Select one of the following options by entering its number.');
```

GOTOXY(18,8);	WRITE('1. QUIT');
GOTOXY(18,9);	WRITE('2. CHECK INFOTABLES');
GOTOXY(18,10);	WRITE('3. CHECK GRAPHICS FILES');
GOTOXY(18,11);	WRITE('4. LOOK FOR DUPLICATE/SIMILAR QUESTIONS');
GOTOXY(18,15);	WRITE('Enter Choice # : ');

```
END; (* menu *)
```

(\* ----- \*)

(\* This procedure loads the information table for a subtest. \*)  
 (\* This procedure is called by: Procedure \*)

```
PROCEDURE LOADINFO;
(* INFOFILE are declared in Procedure INFOSETUP. INFOTABLE is an *)
(* array. *)
```

```
BEGIN
  RESET(INFOFILE,TABNAME);
  SEEK(INFOFILE,RECNUM);
  GET(INFOFILE);
  INFOTABLE := INFOFILE^;
  CLOSE(INFOFILE,NORMAL);
END; (* loadinfo *)
```

```
FUNCTION HASH;
BEGIN
  HASH := (CURRINDEXRECNUM * MAXITEMPOOL)
    + KEY + CURRINDEXRECNUM;
END; (* Hash *)
```

```

(***) open a new text file ***)
PROCEDURE GETNEWFILE;
VAR FILENAME : STRING;
    ERRNUM : INTEGER;

    (* ..... *)

    (***) get a legal filename ***)
FUNCTION NAMEOK : BOOLEAN;
VAR I : INTEGER;
BEGIN
    IF FILENAME = '' THEN
        BEGIN (1)
            FILENAME := DEFAULTFILE;
            GOTOXY(44,0);
            WRITE(FILENAME);
        END (1)
    ELSE
        IF FILENAME[I] = CHR(esc) THEN EXIT(PROGRAM);
        IF (POS('.TEXT',FILENAME) <> (LENGTH(FILENAME) - 4))
            OR (LENGTH(FILENAME) < 6) THEN
            FILENAME := CONCAT(FILENAME, '.TEXT');
    (**!-*)
    RESET(DEST,FILENAME);
    (**!+*)
    IF IORESULT = 0 THEN
        BEGIN (2)
            WRITELN;
            WRITELN;
            WRITE('Destroy old ',FILENAME,'? Press ''N'' or ''Y'' ');
            IF GETCHAR(['y','n','y','n'],TRUE,TRUE,TRUE) IN ['y','y'] THEN
                BEGIN (3)
                    CLOSE(DEST,PURGE);
                    REWRITE(DEST,FILENAME);
                    NAMEOK := TRUE;
                END (3)
            ELSE
                NAMEOK := FALSE;
        END (2)
    ELSE
        BEGIN (4)
            (**!-*)
            REWRITE(DEST,FILENAME);
            (**!+*)
            ERRNUM := IORESULT;
            IF IORESULT <> 0 THEN
                BEGIN (5)
                    WRITELN;
                    WRITELN;
                    WRITELN('Cannot open ',FILENAME,' Io error #',ERRNUM);
                    NAMEOK := FALSE;
                END (5)
            ELSE
                NAMEOK := TRUE;
        END (4)
    END; (4)
END; (* nameok *)

    (* ..... *)

BEGIN (* getnewfile *)
    REPEAT
        PAGE(OUTPUT);
        WRITE('Enter output file name, then press <RET> : ');
        READLN(FILENAME);
    UNTIL NAMEOK;
END;

(** lists the tests in directory & loads *)
PROCEDURE LOADTEST;
VAR I,J,Q,
    TESTNUM,

```

```

RECNUM : INTEGER;
OKTEST : BOOLEAN;
TEXTCODE : CHAR;

BEGIN (* load test *)
  OKTEST := FALSE;
  PAGE(OUTPUT);
  GOTOXY(10,0);
  WRITE('DUPLICATE QUESTION SEARCH (LIST OF SUBTESTS)');
  GOTOXY(0,3);

  (* get the directory information *)
  I := 0;
  J := 0;
  RESET(FILEDIRECTORY,INDEXNAME);
  REPEAT
    SEEK(FILEDIRECTORY,I);
    GET(FILEDIRECTORY);
    IF NOT (FILEDIRECTORY^.UNUSED) THEN
      BEGIN (1)
        J := J + 1;
        IF J <= 10
          THEN
            GOTOXY(0,2+J)
          ELSE
            GOTOXY(40,2+J-10);
        WRITELN(J,'. ',FILEDIRECTORY^.TESTNAME);
      END; (1)
      I := I + 1;
  UNTIL I > MAXSUBTESTS;

  REPEAT
    GOTOXY(0,15);
    WRITELN('INSTRUCTIONS : Enter choice #, then press <RET>.');
    WRITE('                          To escape, press 0 then <RET>.');
    GOTOXY(0,18);
    WRITE(MESSAGE);
  (*!-*)
  READLN(TESTNUM);
  (*!+*)

  IF TESTNUM = 0
  THEN
    BEGIN (1)
      ESCPROC := TRUE;
      CLOSE(FILEDIRECTORY,LOCK);
      EXIT(LOADTEST);
    END; (1)

  IF (TESTNUM < 0) OR (TESTNUM > (MAXSUBTESTS+1))
  THEN
    BEGIN (2)
      WRITELN;
      WRITELN('Invalid test # : ',TESTNUM);
      SQUANK;
      WRITELN;
      STALL;
    END (2)
  ELSE
    BEGIN (3)
      RECNUM := 0;
      Q := 0;

      REPEAT
        SEEK(FILEDIRECTORY,RECNUM);
        GET(FILEDIRECTORY);
        IF NOT (FILEDIRECTORY^.UNUSED) THEN Q := Q + 1;
        RECNUM := RECNUM + 1;
      UNTIL (Q = TESTNUM) OR (RECNUM > MAXSUBTESTS);

      IF Q = TESTNUM
      THEN
        BEGIN (4)

```

```
        CURRINDEXRECNUM := RECNUM - 1;
        OKTEST := TRUE;
      END (4)
    ELSE
      BEGIN (5)
        WRITELN;
        WRITELN('No test loaded');
        WRITELN;
        STALL;
      END; (5)
    END; (3)
  IF NOT OKTEST THEN BLANKLINES(18,6,18);
  UNTIL OKTEST;

  SEEK(FILEDIRECTORY,CURRINDEXRECNUM);
  GET(FILEDIRECTORY);
  DIRECTORY := FILEDIRECTORY^;
  CLOSE(FILEDIRECTORY,LOCK);
END; (* load test *)
```

```

(*-----*)
(* Textfile : D.SEARCH.TEXT *)
(* File last modified : Mar 11, 1983 "Include file for D.MGR" *)
(*-----*)
(*
(* This procedure scans through the CAT system ascii files and searches for
(* questions which are identical or similar. First, a subtest is chosen
(* to scan, then two pieces of data are required : 1. The number of key
(* words to extract from each question, and 2. A minimum criterion for
(* determining if a question is similar.
(*
(* The algorithm uses these two pieces of data in the following manner.
(*
(* A procedure scans each question, extracting the X longest words from each
(* question. This X value is the number of key words desired by the user.
(* These words are normalized into uppercase, the first 8 characters saved,
(* and stored in a packed array.
(*
(* Each question's key words is compared to all previous scanned questions'
(* key words and the number of matches is noted.
(*
(* If the number of matches meets the minimum criterion as specified by the
(* user, then a record is dynamically created, storing the two item codes
(* which matched.
(*
(* 1. Since dynamic variables are used, stack overflow may occur in certain
(* cases. The program does not yet handle this. When stack overflow
(* does occur, it usually means the minimum criterion is not rigid
(* enough, meaning the program is finding a lot of matches.
(* One solution is to raise the minimum criterion so more keywords must
(* match before a question is considered to be a match.
(*
(* 2. This will not scan graphics questions.
(*
(*-----*)

```

# SEGMENT PROCEDURE SEARCHTEXT;

```

CONST (* maximum number of keys you can extract *)
    MAXKEYS = 10;

    (* question textfile control codes *)
    GO10FLAG = 128; (* flags a gotoxy *)
    PAGEFLAG = 129; (* flags text continues on another page *)
    UNUSEDFLAG = 130; (* flags unused byte *)
    ENDITEM = 131; (* flags end of text for a question *)

    VERSION = 'Cat System Duplicate Question Search [1.03]';

TYPE (* key word *)
    KEYTYPE = PACKED ARRAY[0..7] OF CHAR;

    (* record pointer *)
    PPTR = ^PAIRS;

    (* information saved if question match occurred *)
    PAIRS = RECORD
        ITEM1, (* item code of question *)
        ITEM2 : INTEGER;
        NEXT : PPTR; (* next in list of question pairs *)
    END;

VAR (* string character buffer *)
    C, (* counts how many questions looked at *)
    NUMMATCHING, (* number of keywords matching/question *)
    MINCRIT, (* minimum # of keywords which must match *)

```

```

MAXNUMKEYS,      (* maximum # of keywords to fetch/question *)
SLOTNUM,         (* directory index *)
BLK,             (* block where question text starts *)
BLKPTR,          (* byte in block where question text starts *)
I,               (* misc counters *)
K,
L,
M,
N,
DATASLOT : INTEGER; (* record # where question data exists *)

SCAN,            (* true ==> scan the text/save keywords *)
OFFSET,          (* true ==> shift text over 48 columns *)
CONSOLE : BOOLEAN; (* true ==> send output to screen *)

SELECT,
LCOMMAND,
OUTPUT : CHAR;

(* key words for current question *)
KEYWORD : ARRAY[1..MAXKEYS] OF RECORD
    STR : KEYTYPE;
    LENGTH : INTEGER;
END;

(* list of keywords for subtest questions *)
LIST : ARRAY[0..MAXITEMPOOL] OF RECORD
    WORD : PACKED ARRAY[0..79] OF CHAR;
END;

(* does this question have keywords ? Is it normal text, not grafix *)
USED : PACKED ARRAY[0..MAXITEMPOOL] OF BOOLEAN;

KEYSTR : KEYTYPE;

(* pointers to list of matching questions *)
(* p[i] points to head of the list with i key words matching *)
P : ARRAY[1..MAXKEYS] OF RECORD
    LPOINTER : PPTR;
    LCOUNT : INTEGER;
END;

WORDPAIR : PPTR;

(* string variables which allow use of POS for pattern matching *)
TEXTLINE : STRING[80];
TKEY : STRING[8];
TEXTKEYS : ARRAY[1..MAXKEYS] OF STRING[8];

(* file of ascii codes, control #'s *)
ITEMTEXT : FILE;

[.....]

(* reads the item text file & displays item text . This procedure *)
(* doubles as a scanner to extract key words and a procedure to display *)
(* the text of a question. If SCAN is set to true, the key words will *)
(* be saved, else it just displays text on the screen. *)
PROCEDURE SCANQUEST (BLOCKNUM, BLOCKPTR : INTEGER);
CONST MAXBUFSIZE = 2047;
BLOCKOUT = 4;
VAR STARTWORD,
    MIN,
    MINLOC,
    SLENGTH,
    X,
    Y,
    B,
    A,
    CURRPTR,

```

```
CURRBLK,
CHARCODE,
CHARCNT : INTEGER;
```

```
ENDLINE,
ENDWORD,
NOTBLANK,
BADIO : BOOLEAN;
```

```
(* buffer block of ascii, control codes, used to load question text *)
BUF : PACKED ARRAY[0..MAXBUFSIZE] OF 0..139;
```

```
SHORTLINE : PACKED ARRAY[0..38] OF CHAR;
```

```
(.....)
```

```
(* reads a block from disk into the item ascii buffer *)
```

```
PROCEDURE READBLOCK(WHICHBLOCK : INTEGER);
```

```
VAR BLOCKSTRANSFERRED,
    ERRNUM : INTEGER;
```

```
BADIO : BOOLEAN;
```

```
BEGIN
```

```
BADIO := FALSE;
```

```
RESET(ITEMTEXT, TEXTNAME); (* question text *)
```

```
BLOCKSTRANSFERRED := BLOCKREAD(ITEMTEXT, BUF, BLOCKSOUT, WHICHBLOCK);
```

```
BADIO := ((BLOCKSTRANSFERRED < 1) OR (IORESULT <> 0));
```

```
ERRNUM := IORESULT;
```

```
CLOSE(ITEMTEXT, LOCK);
```

```
IF BADIO THEN
```

```
BEGIN (1)
```

```
WRITELN; WRITELN;
```

```
WRITE('Block read io error # ', ERRNUM);
```

```
STALL;
```

```
EXIT(PROGRAM);
```

```
END; (1)
```

```
END; (* read block *)
```

```
(-----)
```

```
(* return the next code in ascii file *)
```

```
FUNCTION BUFCODE : INTEGER;
```

```
BEGIN
```

```
BUFCODE := BUF(CURRPTR);
```

```
CURRPTR := CURRPTR + 1;
```

```
IF CURRPTR > MAXBUFSIZE THEN
```

```
(* end of block/get next block and reset byte ptr *)
```

```
BEGIN (1)
```

```
CURRBLK := CURRBLK + BLOCKSOUT;
```

```
READBLOCK(CURRBLK);
```

```
CURRPTR := 0;
```

```
END; (1)
```

```
END; (* bufcode *)
```

```
(.....)
```

```
BEGIN (* scanquest *)
```

```
IF SCAN THEN
```

```
(* clear key word buffer for this question *)
```

```
FOR I := 1 TO MAXKEYS DO
```

```
BEGIN
```

```
KEYWORD[I].STR := ' ';
```

```
KEYWORD[I].LENGTH := 0;
```

```
END;
```

```
READBLOCK(BLOCKNUM);
```

```
(* set block/byte ptrs *)
```

```
CURRPTR := BLOCKPTR;
```

```
CURRBLK := BLOCKNUM;
```

```
FILLCHAR(LINEBUF(0), 80, ' ');
```

```

(* read bytes from the buffer *)
REPEAT

  (* get char from block buffer *)
  CHARCODE := bufcode;

CASE CHARCODE OF
  GOTOFLAG : BEGIN (1)      (* move cursor *)
    (* next two bytes after flag are x,y coord *)
    X := BUFCODE;
    Y := BUFCODE;
    CHARCNT := BUFCODE;
    IF (CURRPTR + CHARCNT - 1) > MAXBUFSIZE THEN
      BEGIN (2)
        B := (MAXBUFSIZE + 1) - CURRPTR;
        MOVELEFT(BUF(CURRPTR),LINEBUF(X),B);
        X := X + B;
        B := CHARCNT - B;
        CURRBLK := CURRBLK + BLOCKSOUT;
        READBLOCK(CURRBLK);
        CURRPTR := 0;
        MOVELEFT(BUF(CURRPTR),LINEBUF(X),B);
        CURRPTR := CURRPTR + B;
      END (2)
    ELSE
      BEGIN (3)
        MOVELEFT(BUF(CURRPTR),LINEBUF(X),CHARCNT);
        CURRPTR := CURRPTR + CHARCNT;
        IF CURRPTR > MAXBUFSIZE THEN
          BEGIN (4)
            CURRBLK := CURRBLK + BLOCKSOUT;
            CURRPTR := 0;
            READBLOCK(CURRBLK);
          END; (4)
        END; (3)
      END
    IF NOT SCAN THEN
      BEGIN
        IF OFFSET THEN
          GOTOXY(40,Y)
        ELSE
          GOTOXY(0,Y);
        MOVELEFT(LINEBUF(0),SHORTLINE(0),39);
        WRITE(SHORTLINE);
        FILLCHAR(LINEBUF(0),80,' ');
      END
    ELSE
      BEGIN
        K := 0;
        ENDLIN := FALSE;
        REPEAT
          (* skip past leading blanks to find a word *)
          NOTBLANK := FALSE;
          REPEAT
            IF LINEBUF(K) = ' ' THEN
              K := K + 1
            ELSE
              NOTBLANK := TRUE;
          UNTIL (K > 79) OR (NOTBLANK);
          IF K > 79 THEN
            ENDLIN := TRUE
          ELSE
            BEGIN
              (* extract word *)
              SLENGTH := 0;
              ENOWORD := FALSE;
            END
          END
        REPEAT

```

```

STARTWORD := K;
REPEAT
  SLENGTH := SLENGTH + 1;
  K := K + 1;
  IF K > 79 THEN
    ENDLIN := TRUE
  ELSE
    IF LINEBUF[K] = ' ' THEN
      ENDWORD := TRUE;
    UNTIL (ENDLIN) OR (ENDWORD);
    KEYSTR := ' ';
    IF SLENGTH > 8 THEN
      MOVELEFT(LINEBUF[STARTWORD],KEYSTR[0],8)
    ELSE
      MOVELEFT(LINEBUF[STARTWORD],KEYSTR[0],SLENGTH);

  (* see if there are shorter words, if so replace *)
  MIN := SLENGTH;
  MINLOC := 0;
  A := 1;
  REPEAT
    IF KEYWORD[A].LENGTH < MIN THEN
      BEGIN
        MIN := KEYWORD[A].LENGTH;
        MINLOC := A;
      END;
    A := A + 1;
  UNTIL (A > MAXNUMKEYS) OR (MIN = 0);

  IF MINLOC <> 0 THEN
    BEGIN
      WRITE('*');

      (* capitalize the word *)
      FOR I := 0 TO 7 DO
        IF KEYSTR[I] IN ['a'..'z'] THEN
          KEYSTR[I] := CHR((ORD(KEYSTR[I]) - 32));
        KEYWORD[MINLOC].STR := KEYSTR;
        KEYWORD[MINLOC].LENGTH := SLENGTH;
      END;
    END;
    UNTIL ENDLIN;
    FILLCHAR(LINEBUF[0],80,' ');
  END; (* if scan *)
END; {1}

PAGEFLAG : ;
ENDITEM : ;

END;
UNTIL CHARCODE = ENDITEM; (* until end flag hit *)
FILLCHAR(LINEBUF[0],80,' ');
END; (* scanquest *)

(* compare the current question with others in list *)
PROCEDURE COMPARE;
VAR PLOC : INTEGER;
BEGIN
  (* start with first question to compare *)
  L := MAXSAMPLES + 1;
  WHILE (L < SLOTNUM) DO
    BEGIN
      (* if this question has keywords *)
      IF USED[L] THEN
        BEGIN
          WRITE('.');

          (* move the key words from master list into string var for POS *)
          MOVELEFT(LIST[L].WORD[0],TEXTLINE[1],80);

```

```
(* compare current keys to keys loaded from list *)
NUMMATCHING := 0;
```

```
FOR N := 1 TO MAXNUMKEYS DO
BEGIN
  PLOC := POS(TEXTKEYS[N],TEXTLINE);
  IF (PLOC <> 0) AND (TEXTKEYS[N] <> ' ') THEN
  BEGIN
    NUMMATCHING := NUMMATCHING + 1;
    FILLCHAR(TEXTLINE(PLOC),8,' ');
  END;
END;
```

```
(* if number of keys meets minimum, save data *)
IF NUMMATCHING >= MINCRIT THEN
BEGIN
  NEW(WORPAIR);
  WORPAIR^.ITEM1 := SLOTNUM;
  WORPAIR^.ITEM2 := L;
  WORPAIR^.NEXT := P[NUMMATCHING].LPOINTER;
  P[NUMMATCHING].LPOINTER := WORPAIR;
  P[NUMMATCHING].LCOUNT := P[NUMMATCHING].LCOUNT + 1;
  WRITE(' ',NUMMATCHING,' ');
END;
```

```
END;
```

```
L := L + 1;
```

```
END;
```

```
END; (* compare *)
```

```
-----
```

```
(* this procedure gets the search parameters as desired *)
```

```
PROCEDURE GETSEARCHINFO;
```

```
BEGIN
```

```
  PAGE(OUTPUT);
```

```
  GOTOXY(20,0);
```

```
  WRITE('LEVEL OF ANALYSIS');
```

```
  GOTOXY(0,4);
```

```
  WRITELN(
```

```
    'The level of analysis for question comparison is determined by the number');
```

```
  WRITELN(
```

```
    'of key words fetched from each question. If an analysis of 5 is used,');
```

```
  WRITELN(
```

```
    'then the 5 longest words from each question will be used in comparing with');
```

```
  WRITELN(
```

```
    'the 5 longest words from other questions. You can have a MAXIMUM of 10');
```

```
  WRITELN('keys.');
```

```
  WRITELN;
```

```
  REPEAT
```

```
  WRITELN;
```

```
  WRITE('Enter number of keys to use and then press <RET> : ');
```

```
  READLN(MAXNUMKEYS);
```

```
  IF (MAXNUMKEYS > MAXKEYS) OR (MAXNUMKEYS <= 0) THEN SQUAWK;
```

```
  UNTIL (MAXNUMKEYS <= MAXKEYS) AND (MAXNUMKEYS > 0);
```

```
  PAGE(OUTPUT);
```

```
  GOTOXY(20,0);
```

```
  WRITE('MINIMUM CRITERION');
```

```
  GOTOXY(0,4);
```

```
  WRITELN(
```

```
    'The minimum criterion of analysis is the minimum number of keywords that ');
```

```
  WRITELN(
```

```
    'match in order to consider the question as a possible duplicate. If a');
```

```
  WRITELN(
```

```
'minimum criterion of 2 is used, then questions with a number of matching ');
  WRITELN(
'keywords less than 2 are ignored. Your minimum criterion should be less');
  WRITELN('than or equal to ',MAXNUMKEYS);
  WRITELN;
  REPEAT
    WRITELN;
    WRITELN('Enter minimum criterion of keys to consider,');
    WRITE('then press <RET> : ');
    READLN(MINCRIT);
    IF (MINCRIT > MAXNUMKEYS) OR (MINCRIT <= 0) THEN SQUAWK;
  UNTIL (MINCRIT <= MAXNUMKEYS) AND (MINCRIT > 0);
END; (* get searchinfo *)
```

-----

```
(* display data on matching questions *)
PROCEDURE SHOWRESULTS;
VAR PCOMMAND,
    LCOMMAND : CHAR;
    DSLOT,
    SNUM,
    INDEX : INTEGER;
    EXITLOOP,
    NOMATCH : BOOLEAN;
```

-----

```
(* reads item text file & displays item text to printer or file *)
PROCEDURE LISTPRINT(BLOCKNUM, BLOCKPTR : INTEGER);
VAR X,
    Y,
    CURRPTR,
    CURRBLK,
    CHARCODE,
    SKIPBYTE : INTEGER;

    ITEMBUF : PACKED ARRAY[0..511] OF 0..139;
```

```
(* reads a block from disk into the item ascii buffer *)
PROCEDURE READITEMBLOCK(WHICHBLOCK : INTEGER);
VAR BLOCKSTRANSFERRED,
    ERRNUM : INTEGER;

    BADIO : BOOLEAN;
BEGIN
  BADIO := FALSE;
  RESET(ITEMTEXT,TEXTNAME); (* question text *)
  BLOCKSTRANSFERRED := BLOCKREAD(ITEMTEXT,ITEMBUF,1,WHICHBLOCK);
  BADIO := ((BLOCKSTRANSFERRED < 1) OR (IORESULT <> 0));
  ERRNUM := IORESULT;
  CLOSE(ITEMTEXT,LOCK);
  IF BADIO THEN
    BEGIN (1)
      WRITELN;WRITELN;
      WRITE('Block read io error # ',ERRNUM);
      STALL;
      EXIT(PROGRAM);
    END; (1)
  END; (* readitemblock *)
```

.....

```
(* returns next code in file *)
FUNCTION LBUFCODE : INTEGER;
BEGIN
  LBUFCODE := ITEMBUF(CURRPTR);
```

```

CURRPTR := CURRPTR + 1;
IF CURRPTR > 511 THEN
BEGIN (1)
CURRBLK := CURRBLK + 1;
READITEMBLOCK(CURRBLK);
CURRPTR := 0;
END; (1)
END; (* lbufcode *)

{.....}

BEGIN (* listprint *)
READITEMBLOCK(BLOCKNUM);
CURRPTR := BLOCKPTR;
CURRBLK := BLOCKNUM;
REPEAT
CHARCODE := LBUFCODE;
CASE CHARCODE OF
GOTOFLAG : BEGIN (1)
X := LBUFCODE;
Y := LBUFCODE;
(* ignore next byte, due to a file modification *)
SKIPBYTE := LBUFCODE;
Writeln(DEST);
WRITE(DEST, ' ' : X);
END; (1)
PAGEFLAG : BEGIN (3)
Writeln(DEST);
Writeln(DEST);
Writeln(DEST);
END; (3)
ENDITEM : ;
END; (* cases *)
IF (CHARCODE >= 32) AND (CHARCODE <= 126) THEN
BEGIN (4)
X := X + 1;
WRITE(DEST, CHR(CHARCODE));
END; (4)
UNTIL CHARCODE = ENDITEM;
END; (* print *)

{-----}

(* lists things to the console *)
PROCEDURE LCONSOLE;
VAR FIXCHAR : CHAR;
BEGIN
SCANQUEST(BLK, BLKPTR);
IF OFFSET THEN
GOTOXY(40, 20)
ELSE
GOTOXY(8, 20);
WRITE('Item code : ', DIRECTORY.ITEMCODE(SNUM));

IF OFFSET THEN
GOTOXY(40, 21)
ELSE
GOTOXY(8, 21);
WRITE('Answer : ');
CASE ITEMINFO.ATYPE OF
CHARVALUE : Writeln(' ', ITEMINFO.ANSWER);
INTVALUE : Writeln(' ', ITEMINFO.INTANSWER);
SEVENCHR : BEGIN
FOR I := 1 TO ITEMINFO.ANSWERCOUNT DO
WRITE(' ', ITEMINFO.CHRANSWER(I));
Writeln;
END;
END; (* cases *)
END; (* lconsole *)

{-----}

(* lists item text and data to file/printer *)

```

```

PROCEDURE LFILE;
BEGIN
  Writeln(Dest);
  Writeln(Dest, ' Item code : ', DIRECTORY.ITEMCODE(SNUM));
  Writeln(Dest);
  LISTPRINT(BLK, BLKPTR);
  Writeln(Dest);
  Writeln(Dest);
  WRITE(Dest, ' Answer(s) : ');
  CASE ITEMINFO.ATYPE OF
    CHARVALUE : Writeln(Dest, ITEMINFO.ANSWER);
    INTVALUE   : Writeln(Dest, ITEMINFO.INTANSWER);
    SEVENCHR   : BEGIN (4)
                    FOR I := 1 TO ITEMINFO.ANSWERCOUNT DO
                      WRITE(Dest, ITEMINFO.CHANSWER[I], ' ');
                    Writeln(Dest);
                  END; (4)
  END; (* cases *)
  Writeln(Dest);
END; (* lfile *)

```

(\* -----\*)

```

(* write question text *)
PROCEDURE TEXTOUTPUT;
BEGIN
  IF NOT CONSOLE THEN
    BEGIN
      Writeln(Dest);
      Writeln(Dest);
      FOR I := 1 TO 79 DO
        WRITE(Dest, '*');
      Writeln(Dest);
      Writeln(Dest);
    END;
  WORDPAIR := P[INDEX].LPOINTER;
  EXITLOOP := FALSE;
  WHILE (WORDPAIR <> NIL) AND (NOT EXITLOOP) DO
    BEGIN
      SNUM := WORDPAIR^.ITEM1;
      OSLOT := HASH(SNUM);
      SEEK(FILEITEMINFO, OSLOT);
      GET(FILEITEMINFO);
      ITEMINFO := FILEITEMINFO^;
      BLK := ITEMINFO.ITEMBLOCK;
      BLKPTR := ITEMINFO.ITEMPTR;
      OFFSET := FALSE;

      IF CONSOLE THEN
        BEGIN
          PAGE(OUTPUT);
          LCONSOLE
        END
      ELSE
        BEGIN
          LFILE;
          Writeln(Dest);
          Writeln(Dest);
          FOR I := 1 TO 39 DO
            WRITE(Dest, '- ');
          Writeln(Dest);
          Writeln(Dest);
        END;

      SNUM := WORDPAIR^.ITEM2;
      OSLOT := HASH(SNUM);
      SEEK(FILEITEMINFO, OSLOT);
      GET(FILEITEMINFO);
      ITEMINFO := FILEITEMINFO^;
      BLK := ITEMINFO.ITEMBLOCK;
      BLKPTR := ITEMINFO.ITEMPTR;
    END;
  END;

```

```

OFFSET := TRUE;

IF CONSOLE THEN
BEGIN
  LCONSOLE;
  GOTOXY(0,23);
  WRITE('Press <RET> to continue, <ESC> to quit ');
  IF GETCHAR((CHR(RET),CHR(ESC)),TRUE,TRUE,TRUE) = CHR(ESC) THEN
    EXITLOOP := TRUE;
END
ELSE
BEGIN
  LFILE;
  WRITELN(DEST);
  WRITELN(DEST);
  FOR I := 1 TO 79 DO
    WRITE(DEST,'*');
  WRITELN(DEST);
  WRITELN(DEST);
END;

WORDPAIR := WORDPAIR^.NEXT;
END;
END; (* textoutput *)

```

(\* ----- \*)

```

(* get the output destination for results *)
PROCEDURE GETOUTINFO;
BEGIN
  PAGE(OUTPUT);
  GOTOXY(20,0);
  WRITE('OUTPUT SELECT MENU');
  GOTOXY(0,4);
  WRITE('Select one of the following options by entering its number. ');
  GOTOXY(16,8);
  WRITE('1. QUIT');
  GOTOXY(16,9);
  WRITE('2. SEARCH RESULTS TO CONSOLE');
  GOTOXY(16,10);
  WRITE('3. SEARCH RESULTS TO PRINTER');
  GOTOXY(16,11);
  WRITE('4. SEARCH RESULTS TO FILE');
  GOTOXY(16,18);
  WRITE('Enter Choice # : ');
  SELECT := GETCHAR(('1'..'4'),TRUE,TRUE,TRUE);
  CONSOLE := FALSE;

  CASE SELECT OF
    '1' : ;
    '2' : BEGIN
      REWRITE(DEST,'CONSOLE:');
      CONSOLE := TRUE;
      END;
    '3' : REWRITE(DEST,UNITNUMPRINTER);
    '4' : GETNEWFILE;
  END;
END; (* getoutinfo *)

```

(\* begin search results \*)
BEGIN

```

(* turn off scan flag so scan routine will display text instead of scan *)
SCAN := FALSE;

WRITE(CHR(1));

NOMATCH := TRUE;

REPEAT

```

```

FOR INDEX := MAXNUMKEYS DOWNT0 1 DO
BEGIN
  IF P[INDEX].LCOUNT > 0 THEN
  BEGIN
    NOMATCH := FALSE;
    PAGE(OUTPUT);
    Writeln(P[INDEX].LCOUNT, ' matches occurred on ', INDEX, ' keywords. ');
    Writeln;
    WRITE('Do you want to see the itemcodes of matches ? Y/N : ');
    LCOMMAND := GETCHAR(['Y', 'N', 'y', 'n'], TRUE, TRUE, TRUE);

    IF LCOMMAND IN ['y', 'Y'] THEN
    BEGIN
      Writeln;
      Writeln;
      Writeln;
      WRITE('Would you like to see the question text also ? Y/N : ');
      PCOMMAND := GETCHAR(['Y', 'N', 'y', 'n'], TRUE, TRUE, TRUE);

      GETOUTINFO;

      IF SELECT <> '1' THEN
      BEGIN
        PAGE(OUTPUT);

        FOR K := 1 TO 79 DO
          WRITE(DEST, '* ');
          Writeln(DEST);
          Writeln(DEST, DIRECTORY.TESTNAME);
          FOR K := 1 TO 79 DO
            WRITE(DEST, '* ');
            Writeln(DEST);
            Writeln(DEST, 'Level of Analysis : ', MAXNUMKEYS);
            Writeln(DEST, 'Minimum Criterion : ', MINCRIT);
            Writeln(DEST, 'Number of Matching Questions on ', INDEX, ' Keys : ',
              P[INDEX].LCOUNT);
            Writeln(DEST);

            WORDPAIR := P[INDEX].LPOINTER;
            L := 0;
            WHILE WORDPAIR <> NIL DO
            BEGIN
              L := L + 1;
              WRITE(DEST, DIRECTORY.ITEMCODE(WORDPAIR^.ITEM1), ' / ',
                DIRECTORY.ITEMCODE(WORDPAIR^.ITEM2), ' ');
              WORDPAIR := WORDPAIR^.NEXT;
              IF L MOD 5 = 0 THEN Writeln(DEST);
            END;

            Writeln(DEST);
            Writeln(DEST);

            IF CONSOLE THEN
              STALL;

            IF PCOMMAND IN ['y', 'Y'] THEN
              TEXTOUTPUT;

            CLOSE(DEST, LOCK);
          END;
        END;
      END;
    END;
  END;
  PAGE(OUTPUT);
  IF NOMATCH THEN
  BEGIN
    Writeln('No matches occurred for this scan of ', DIRECTORY.TESTNAME);
    Writeln;
    STALL;
  END;

```

```

        EXIT(SHOWRESULTS);
    END
    ELSE
        WRITE('Would you like to look at the results again?      Y/N : ');
    UNTIL (GETCHAR(['Y','y','N','n'],TRUE,TRUE,TRUE) IN ['N','n']);
    END; (* showresults *)

```

(-----)

```

(* initialize arrays *)
PROCEDURE INITIALIZE;
BEGIN
    FOR I := 1 TO MAXKEYS DO
        BEGIN
            P[I].LPOINTER := NIL;
            P[I].LCOUNT := 0;
        END;

    FOR I := 0 TO MAXITEMPOOL DO
        USED[I] := FALSE;

    TKEY := ' ';
    TEXTLINE := ' ';

    PAGE(OUTPUT);
    GOTOXY(0,6);
    WRITE(VERSION);
    GOTOXY(0,8);
    WRITELN(DIRECTORY.TESTNAME);
    WRITELN('Level of Analysis : ',MAXNUMKEYS);
    WRITELN('Minimum Criterion : ',MINCRIT);
    GOTOXY(0,12);
    WRITE(CHR(2));
    END; (* initialize *)

```

(\*-----\*)

```

BEGIN (* searchtext *)

    (* set terminate program flag to false *)
    ESCPROC := FALSE;

    (* get the subtest you want to search *)
    LOADTEST('Search text in which subtest? : ');

    (* if you are not done *)
    IF NOT ESCPROC THEN
        BEGIN

            (* get # of keywords to fetch, criterion *)
            GETSEARCHINFO;

            (* set up data structures *)
            INITIALIZE;

            (* start with first question *)
            SLOTNUM := MAXSAMPLES + 1;

            (* open the question data file *)
            RESET(FILEITEMINFO,DATANAME);

            (* initialize count of number of questions processed *)
            C := 0;

            (* set flag for extracting key words *)
            SCAN := TRUE;

            (* look at all the questions in the subtest directory *)
            REPEAT

```

```

(* if the item code is > 0 then question exists *)
IF DIRECTORY.ITEMCODE(SLOTNUM) >= 0 THEN
BEGIN (10)

  (* get data of question *)
  DATASLOT := HASH(SLOTNUM);
  SEEK(FILEITEMINFO,DATASLOT);
  GET(FILEITEMINFO);
  ITEMINFO := FILEITEMINFO^;

  (* if not a graphics question, then we can extract text *)
  IF NOT ITEMINFO.GRAPHICS THEN
  BEGIN

    (* get the text pointers *)
    BLK := ITEMINFO.ITEMBLOCK;
    BLKPTR := ITEMINFO.ITEMPTR;

    (* mark this question has keywords *)
    USED(SLOTNUM) := TRUE;

    (* count how many questions processed so far *)
    C := C + 1;

    (* indicate number of questions processed and memory available *)
    WRITELN;
    WRITE(C:4,'.    ','MEMAVAIL,') ');

    (* look at the question and extract keywords *)
    SCANQUEST(BLK,BLKPTR);

    (* save the key words for this question in master list *)
    N := 0;
    FOR M := 1 TO MAXNUMKEYS DO
    BEGIN
      KEYSTR := KEYWORD[M].STR;
      MOVELEFT(KEYSTR(0),LINEBUF(N),8);
      N := N + 8;
    END;
    LIST(SLOTNUM).WORD := LINEBUF;

    (* move keyword in a list of "strings" so we can use the *)
    (* built in POS function to find keyword match *)
    FOR N := 1 TO MAXNUMKEYS DO
    BEGIN
      KEYSTR := KEYWORD[N].STR;
      MOVELEFT(KEYSTR(0),TKEY(1),8);
      TEXTKEYS[N] := TKEY;
    END;

    (* compare our current keywords with master list *)
    (* if question match occurred, allocate new *)
    (* record and store in appropriate list. *)
    COMPARE;

  END;
END; (10)
SLOTNUM := SLOTNUM + 1;
UNTIL (SLOTNUM > MAXITEMPOOL);

(* notify done with scan *)
FOR I := 1 TO 8 DO
  SQUAWK;

(* display the results of scan *)
SHOWRESULTS;

CLOSE(FILEITEMINFO,NORMAL);

```

END;

END; (\* searchtext \*)

```

(*****)
(* FILE : D.INFOFAB.TEXT "include file for D.MGR *)
(* File last modified : Mar 11,1983 *)
(*****)

(* It is a verification that all items *)
(* in the info table are also in the subtest directories. *)
(* It works by loading an infotable then checking the subtest directory to *)
(* see if the infotable entry exists in the subtest database. *)
SEGMENT PROCEDURE CHECKINFOTABS;

TYPE (* save locations in infotable where errors occurred *)
  ERRMATRIX = PACKED ARRAY[1..INFOCOLUMN,1..INFOROW] OF BOOLEAN;

VAR LINE, (* keep track of line number on screen *)
  ERRORCNT, (* running count of errors *)
  DSLOT, (* directory slot of item *)
  I, (* various counters *)
  J,
  K : INTEGER;

(* keeps tracks of infotable errors for each subtest *)
ERRTAB : PACKED ARRAY[0..MAXSUBTESTS] OF RECORD
  ECNT : INTEGER;
  ELIST : ERRMATRIX;
END;

(* list the errors in the infotable *)
PROCEDURE LISTINFOERRS;
VAR SELECT : CHAR;
  CONSOLE : BOOLEAN;
  HEADER : STRING;

  (* get the output destination *)
  PROCEDURE GETOUTDEST;
  BEGIN
    PAGE(OUTPUT);
    GOTOXY(20,0);
    WRITE('OUTPUT SELECT MENU');
    GOTOXY(0,4);
    WRITE('Select one of the following options by entering its number. ');
    GOTOXY(16,8);
    WRITE('1. QUIT');
    GOTOXY(16,9);
    WRITE('2. INFOFABLE ERRORS TO CONSOLE');
    GOTOXY(16,10);
    WRITE('3. INFOFABLE ERRORS TO PRINTER');
    GOTOXY(16,11);
    WRITE('4. INFOFABLE ERRORS TO FILE');
    GOTOXY(16,18);
    WRITE('Enter Choice # : ');
    SELECT := GETCHAR(['1'..'4'],TRUE,TRUE,TRUE);
    CONSOLE := FALSE;

    CASE SELECT OF
      '1' : EXIT(CHECKINFOTABS);
      '2' : BEGIN
        CONSOLE := TRUE;
        REWRITE(DEST,'CONSOLE');
        END;
      '3' : REWRITE(DEST,UNITNUMPRINTER);
      '4' : GETNEWFILE;
    END;
  END; (* getoutdest *)

  BEGIN (* listinfoerrs *)

    (* get information to send output destination *)
    GETOUTDEST;

    (* write a header *)
    PAGE(OUTPUT);
  
```

```

HEADER :=
'ITEMCODE ROW COLUMN      ITEMCODE ROW COLUMN      ITEMCODE ROW COLUMN';

(* open the subtest directories file *)
RESET(FILEIRECTORY,INDEXNAME);

(* look at each subtest *)
FOR CURRINDEXRECNUM := 0 TO 20 DO
BEGIN

    (* if there were errors, display them *)
    IF ERRTAB(CURRINDEXRECNUM).ECNT > 0 THEN
    BEGIN

        (* get the subtest directory *)
        SEEK(FILEIRECTORY,CURRINDEXRECNUM);
        GET(FILEIRECTORY);

        (* if a subtests exists here *)
        IF NOT (FILEIRECTORY^.UNUSED) THEN
        BEGIN

            (* get the subtest directory *)
            DIRECTORY := FILEIRECTORY^;

            (* write some diagnostic info *)
            Writeln(DEST);
            Writeln(DEST);
            Writeln(DEST);
            PAGE(OUTPUT);
            Writeln(DEST,'Subtest : ',DIRECTORY.TESTNAME);
            Writeln(DEST,'This items do not exist in database. ');
            Writeln(DEST);
            Writeln(DEST,HEADER);
            LINE := 1;

            (* load the infotable for this subtest *)
            LOADINFO(CURRINDEXRECNUM);

            (* check the error matrix and display errors *)
            FOR J := 1 TO INFOROW DO
            FOR I := 1 TO INFOCOLUMN DO
            BEGIN
                IF (ERRTAB(CURRINDEXRECNUM).ELIST[I,J]) THEN
                BEGIN

                    (* make it look nice on the screen *)
                    IF (LINE MOD 3 = 0) THEN
                        Writeln(DEST,INFOTABLE[I,J] : 6, I:7, J:6)
                    ELSE
                        WRITE(DEST,INFOTABLE[I,J] : 6, I:7, J:6, ' ');
                    LINE := LINE + 1;

                    (* let user control screen scrolling *)
                    IF (CONSOLE) AND (LINE = 55) THEN
                    BEGIN
                        Writeln;
                        WRITE('Press <RET> to continue or <ESC> to quit : ');
                        IF GETCHAR([CHR(RET),CHR(ESC)],TRUE,TRUE,TRUE) = CHR(ESC)
                        THEN
                        BEGIN
                            CLOSE(DEST,NORMAL);
                            EXIT(CHECKINFOTABS);
                        END;

                        (* start new screen page, write header again *)
                        PAGE(OUTPUT);
                        Writeln(DEST,'Subtest : ',DIRECTORY.TESTNAME);
                        Writeln(DEST,'This items do not exist in database. ');
                        Writeln(DEST);
                        Writeln(DEST,HEADER);
                        LINE := 1;
                    END;
                END;
            END;
        END;
    END;
END;

```

```

        END;
    END;

    (* last screen page, wait till user wishes to continue *)
    IF (CONSOLE) AND (LINE <> 1) THEN
    BEGIN
        Writeln;
        Write('Press <RET> to continue or <ESC> to quit : ');
        IF GETCHAR([CHR(RET),CHR(ESC)],TRUE,TRUE,TRUE) = CHR(ESC)
        THEN
        BEGIN
            CLOSE(DEST,NORMAL);
            EXIT(CHECKINFOTABS);
        END;
    END;
END;
END;
END;
CLOSE(DEST,NORMAL);
CLOSE(FILEDIRECTORY,NORMAL);
END; (* list infoerrs *)

BEGIN
    PAGE(OUTPUT);

    (* open the subtest directories file *)
    RESET(FILEDIRECTORY,INDEXNAME);

    (* write a header *)
    LINE := 2;
    WRITE('          SUBTEST                                # of infotable errors');

    (* initialize error counts for each subtest *)
    FOR I := 0 TO MAXSUBTESTS DO
        ERRTAB[I].ECNT := 0;
    GOTOXY(0,2);

    (* step through the subtest directories file *)
    FOR CURRINDEXRECNUM := 0 TO MAXSUBTESTS DO
    BEGIN
        SEEK(FILEDIRECTORY,CURRINDEXRECNUM);
        GET(FILEDIRECTORY);

        (* if a subtests exists here *)
        IF NOT (FILEDIRECTORY^.UNUSED) THEN
        BEGIN

            (* get the directory *)
            DIRECTORY := FILEDIRECTORY^.;

            (* load infotable for this subtest *)
            LOADINFO(CURRINDEXRECNUM);

            ERRORCNT := 0; (* initialize running count of errors *)

            (* look through the entire infotable *)
            FOR J := 1 TO INFOROW DO
            BEGIN
                WRITE(' ');
                FOR I := 1 TO INFOCOLUMN DO
                BEGIN

                    (* if infotable has no value *)
                    IF INFOTABLE[I,J] < 0 THEN
                        DSLOT := -1
                    ELSE
                        (* return the slot number in directory if any *)
                        DSLOT := SLOT(INFOTABLE[I,J]);

                    (* negative value means there was no such item in directory *)
                    IF DSLOT < 0 THEN
                    BEGIN
                        ERRORCNT := ERRORCNT + 1; (* increment error count *)
                    END
                END
            END
        END
    END

```

```
      (* update error matrix *)
      ERRTAB(CURRINDEXRECNUM).ELIST(I,J) := TRUE;
    END
  ELSE
    ERRTAB(CURRINDEXRECNUM).ELIST(I,J) := FALSE;
  END;
END;

(* update total errors for this subtest *)
ERRTAB(CURRINDEXRECNUM).ECNT := ERRORCNT;
BLANKLINES(LINE,1,LINE);
WRITE(FILEDIRECTORY^.TESTNAME);
GOTOXY(50,LINE);
WRITELN(ERRORCNT);
LINE := LINE + 1;
END;
END;
CLOSE(FILEDIRECTORY,NORMAL);
WRITE('Do you want to list the errors ? Y/N : ');
IF GETCHAR(['Y','N','y','n'],TRUE,TRUE,TRUE) IN ['Y','y'] THEN
  LISTINFOERRS;
END; (* Checkinfofab *)
```

```

(*****)
(* FILE : D.GRAFIX.TEXT "include file for D.MGR *)
(* File last modified : Mar 11,1983 *)
(*****)

(*****)
(* checks to see that if the graphics flag is set, there is *)
(* a foto file or compressed file out on the volume catfoto *)
(* It works by turning off the i/o checking , then attempting *)
(* to reset the grafix file in question. If the i/o error was *)
(* zero, then the graphics file existed, if not, then we keep *)
(* track of the errors. *)
(*****)
SEGMENT PROCEDURE CHECKGFILES;

TYPE (* keeps track of errors for each item *)
    ERRLIST = PACKED ARRAY[0..MAXITEMPOOL] OF BOOLEAN;

VAR X,Z, (* used as counters *)
    LINE, (* keeps track of line on screen *)
    CERRORS, (* count of compressed grafix errors *)
    FERRORS, (* count of normal fotofile errors *)
    GCNT, (* total grafix count in subtest *)
    I, (* various counters *)
    J : INTEGER;

    STR, (* used to construct filename for grafix *)
    DIGITSTR, (* from the itemcode. *)
    FNAME : STRING;
    C : CHAR;

    (* keeps track of errors for each subtest *)
    GERRORS : PACKED ARRAY[0..MAXSUBTESTS] OF RECORD
        (* number of errors *)
        GERRCNT : INTEGER;
        (* graphic error *)
        FLIST,
        (* krunched error *)
        KLIST : ERRLIST;
    END;

(* list the errors in the infotable *)
PROCEDURE LISTFOTOERRS;
VAR SELECT : CHAR;
    CONSOLE : BOOLEAN;
    HEADER : STRING;

    (* get the output destination *)
    PROCEDURE GETOUTDEST;
    BEGIN
        PAGE(OUTPUT);
        GOTOXY(20,0);
        WRITE('OUTPUT SELECT MENU');
        GOTOXY(0,4);
        WRITE('Select one of the following options by entering its number. ');
        GOTOXY(16,8);
        WRITE('1. QUIT');
        GOTOXY(16,9);
        WRITE('2. GRAPHICS ERRORS TO CONSOLE');
        GOTOXY(16,10);
        WRITE('3. GRAPHICS ERRORS TO PRINTER');
        GOTOXY(16,11);
        WRITE('4. GRAPHICS ERRORS TO FILE');
        GOTOXY(16,18);
        WRITE('Enter Choice # : ');
        SELECT := GETCHAR(['1'..'4'],TRUE,TRUE,TRUE);
        CONSOLE := FALSE;
    END;

    CASE SELECT OF
        '1' : EXIT(CHECKGFILES);
        '2' : BEGIN
            CONSOLE := TRUE;
            REWRITE(DEST,'CONSOLE:');
        END;
    END;

```

```

        END;
        '3' : REWRITE (DEST,UNITNUMPRINTER);
        '4' : GETNEWFILE;
    END;
    END; (* getoutdest *)

BEGIN (* listfotoerre *)

    (* get destination to send output *)
    GETOUTDEST;
    PAGE (OUTPUT);

    (* open the subtest directories file *)
    RESET (FILEDIRECTORY,INDEXNAME);

    (* scan each subtest *)
    FOR CURRINDEXRECNUM := 0 TO 20 DO
    BEGIN

        (* if there were some errors *)
        IF ERRORS (CURRINDEXRECNUM).GERRCNT > 0 THEN
        BEGIN

            (* get the subtest directory *)
            SEEK (FILEDIRECTORY,CURRINDEXRECNUM);
            GET (FILEDIRECTORY);
            IF NOT (FILEDIRECTORY^.UNUSED) THEN
            BEGIN
                DIRECTORY := FILEDIRECTORY^;

                (* write a header *)
                WRITELN (DEST);
                WRITELN (DEST);
                WRITELN (DEST);
                PAGE (OUTPUT);
                WRITELN (DEST,'Subtest : ',DIRECTORY.TESTNAME);
                WRITELN (DEST,
                    'This items are missing foto files or compressed graphic files. ');
                WRITELN (DEST);
                WRITELN (DEST,
                    'ITEMCODE      MISSING GRAPHICS      ITEMCODE      MISSING GRAPHICS');
                LINE := 1;

                (* scan the error list *)
                FOR J := 1 TO MAXITEMPOOL DO
                BEGIN

                    (* if an item existed in this directory slot and there *)
                    (* was a graphics error. *)
                    IF (ERRORS (CURRINDEXRECNUM).FLIST (J)) AND
                        (DIRECTORY.ITEMCODE (J) > 0) THEN
                    BEGIN

                        (* if the error was a compressed grafix error *)
                        IF (ERRORS (CURRINDEXRECNUM).KLIST (J)) THEN
                            WRITE (DEST,DIRECTORY.ITEMCODE (J) : 6,
                                'compressed file');
                        ELSE
                            (* the error was a fotofile error *)
                            WRITE (DEST,DIRECTORY.ITEMCODE (J) : 6,
                                'fotofile ');
                        LINE := LINE + 1;

                        (* format it so it looks nice *)
                        IF ODD (LINE) THEN
                            WRITELN (DEST)
                        ELSE
                            WRITE (DEST, ' ');
                    END;
                END;

                (* allow user to see screen without scrolling *)
            
```

```

IF (CONSOLE) AND (LINE = 38) THEN
BEGIN
  WRITELN;
  WRITE('Press <RET> to continue or <ESC> to quit : ');
  IF GETCHAR([CHR(RET),CHR(ESC)],TRUE,TRUE,TRUE) = CHR(ESC)
  THEN
  BEGIN
    CLOSE(DEST,NORMAL);
    EXIT(CHECKGFILES);
  END;

  (* write a new page of output to screen and the header *)
  PAGE(OUTPUT);
  WRITELN('Subtest : ',DIRECTORY.TESTNAME);
  WRITELN(
    'This items are missing foto files or compressed graphic files. ');
  WRITELN;
  WRITELN(
    'ITEMCODE      MISSING GRAPHICS                      ITEMCODE      MISSING GRAPHICS');
  LINE := 1;
  END;
END;

(* allow user to see the last page without scrolling *)
IF (CONSOLE) AND (LINE <> 1) THEN
BEGIN
  WRITELN;
  WRITE('Press <RET> to continue or <ESC> to quit : ');
  IF GETCHAR([CHR(RET),CHR(ESC)],TRUE,TRUE,TRUE) = CHR(ESC)
  THEN
  BEGIN
    CLOSE(DEST,NORMAL);
    EXIT(CHECKGFILES);
  END;
END;
END;
END;
CLOSE(DEST,NORMAL);
CLOSE(FILEIDIRECTORY,NORMAL);
END; (* list FOTOerrs *)

(* searches through the directory looking for questions *)
(* with graphics flags on, then checks if file is on volume *)
PROCEDURE GSEARCH;
VAR DATASLOT : INTEGER;
BEGIN
  (* open the question data files *)
  RESET(FILEITEMINFO,DATANAME);

  (* scan the entire directory *)
  FOR J := 1 TO MAXITEMPOOL DO
  BEGIN
    (* initialize error flags *)
    GERRORS[CURRENDEXRECNUM].FLIST[J] := FALSE;
    GERRORS[CURRENDEXRECNUM].KLIST[J] := FALSE;

    (* indicate that something is happening *)
    IF J MOD 10 = 0 THEN
      WRITE('.');

    (* if an item exists in this data slot *)
    IF DIRECTORY.ITEMCODE[J] > 0 THEN
    BEGIN
      (* get the record number where its data exists *)
      DATASLOT := HASH(J);

      (* get its data *)
      SEEK(FILEITEMINFO,DATASLOT);
    END;
  END;
END;

```

```

GET(FILEITEMINFO);
ITEMINFO := FILEITEMINFO^;

(* if the graphics flag is set *)
IF ITEMINFO.GRAFIXES THEN
BEGIN
    (* update count of graphics for this subtest *)
    GCNT := GCNT + 1;

    (* make the file name for the graphic question *)
    (* change an integer to a string value *)
    DIGITSTR := ' ';
    STR := '';
    IF J > 5 THEN
        Z := DIRECTORY.ITEMCODE(J)
    ELSE
        Z := J;

    REPEAT
        X := Z MOD 10;
        C := CHR(X+48);
        DIGITSTR(1) := C;
        STR := CONCAT(DIGITSTR,STR);
        Z := Z DIV 10;
    UNTIL Z <= 0;
    DIGITSTR(1) := CHR(CURRINDEXRECNUM+65);
    C := DIGITSTR(1);

    (* if the question is a compressed grafix *)
    IF ITEMINFO.DUMMY1 = 1.0 THEN
    BEGIN
        (* check if sample question *)
        IF J < 6 THEN (* it is sample question *)
            FNAME := CONCAT('/CATFOTO/',DIGITSTR,'DIR/G',
                            DIGITSTR,'SQ',STR,'.DATA')
        ELSE
            FNAME := CONCAT('/CATFOTO/',DIGITSTR,'DIR/G',
                            DIGITSTR,STR,'.DATA');

        (* see if it is out on catfoto volume *)
        (*$!-$*)
        RESET(DEST,FNAME);
        (*$!+$*)

        (* error occurred *)
        IF IORESULT <> 0 THEN
        BEGIN
            CERRORS := CERRORS + 1;
            CERRORS(CURRINDEXRECNUM).FLIST(J) := TRUE;
            CERRORS(CURRINDEXRECNUM).KLIST(J) := TRUE;
        END;

        CLOSE(DEST,NORMAL);
    END
    ELSE
    BEGIN
        (* check if sample question *)
        IF J < 6 THEN (* it was sample question *)
            FNAME := CONCAT('/CATFOTO/',DIGITSTR,'DIR/G',
                            DIGITSTR,'SQ',STR,'.FOTO')
        ELSE
            FNAME := CONCAT('/CATFOTO/',DIGITSTR,'DIR/G',
                            DIGITSTR,'Q',STR,'.FOTO');

        (* see if it is out on disk *)
        (*$!-$*)
        RESET(DEST,FNAME);
        (*$!+$*)

        (* error occurred *)
        IF IORESULT <> 0 THEN

```

```

        BEGIN
            ERRORS := ERRORS + 1;
            GERRORS[CURRINDEXRECNUM].FLIST[J] := TRUE;
        END;

        CLOSE(DEST,NORMAL);
    END; (* if it was a normal or compressed graphics *)
END; (* if it was a graphics *)
END; (* if there was an item at this slot *)
END; (* loop which looks at entire directory *)

CLOSE(FILEITEMINFO,NORMAL);
END; (* gsearch *)

BEGIN
    PAGE(OUTPUT);

    (* open the subtest directories file *)
    RESET(FILEDIRECTORY,INDEXNAME);

    (* write a diagnostic header *)
    LINE := 2;
    WRITE(
        SUBTEST                                # of graphics    foto errs    krunch    errs');
    GOTOXY(0,2);

    (* look at each subtest directory record *)
    FOR CURRINDEXRECNUM := 0 TO MAXSUBTESTS DO
        BEGIN
            (* initialize error count *)
            GERRORS[CURRINDEXRECNUM].GERRCNT := 0;

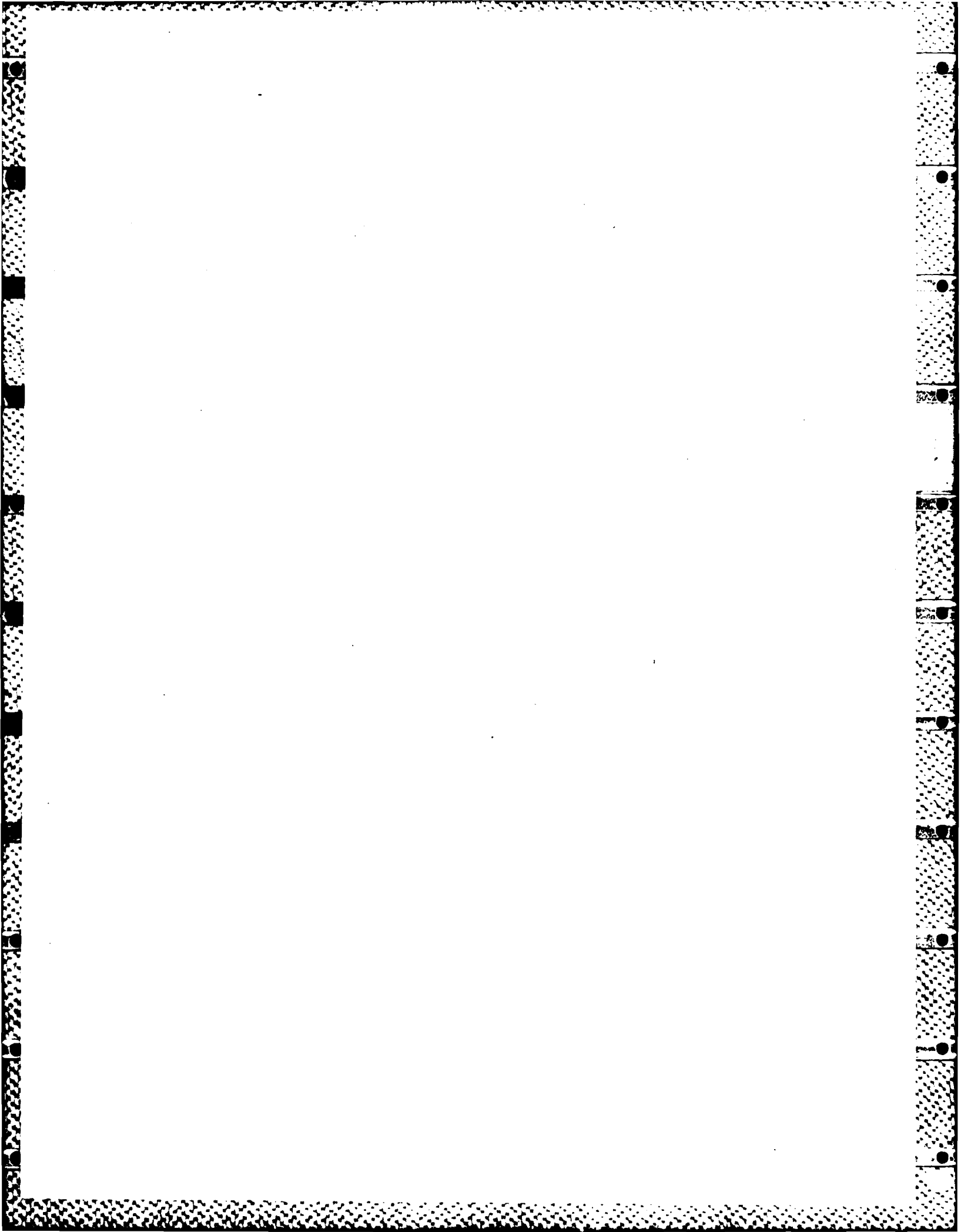
            (* check if there is a subtest *)
            SEEK(FILEDIRECTORY,CURRINDEXRECNUM);
            GET(FILEDIRECTORY);
            IF NOT (FILEDIRECTORY^.UNUSED) THEN
                BEGIN
                    (* get the subtest directory *)
                    DIRECTORY := FILEDIRECTORY^;

                    (* initialize errors *)
                    ERRORS := 0;
                    CERRORS := 0;
                    GCNT := 0;

                    (* look at each item, if the grafix flag is set, and if so *)
                    (* if there is a graphics file for the question. *)
                    GSEARCH;

                    (* write out diagnostic information *)
                    BLANKLINES(LINE,1,LINE);
                    WRITE(FILEDIRECTORY^.TESTNAME);
                    GOTOXY(42,LINE);
                    WRITE(GCNT);
                    GOTOXY(55,LINE);
                    WRITE(ERRORS);
                    GOTOXY(70,LINE);
                    WRITELN(CERRORS);
                    LINE := LINE + 1;
                    GERRORS[CURRINDEXRECNUM].GERRCNT := CERRORS + ERRORS;
                END;
            END;
            CLOSE(FILEDIRECTORY,NORMAL);
            CLOSE(OUTFILE,NORMAL);
            WRITE('Do you want to list the errors? Y/N : ');
            IF GETCHAR(['Y','N','y','n'],TRUE,TRUE,TRUE) IN ['Y','y'] THEN
                LISTFOTOERRS;
            END; (* CheckGFILES *)
        END;
    END;

```



**MISC.DIR:**  
**Subdirectory - Miscellaneous Textfiles**



```
(*S*)
(*****)
(*)
(*)      Textfile : MISC/CATFFORMAT.TEXT      Volume : TFILES      (*)
(*)      Codefile : KATFFORMAT.CODE          Volume : CATDATA      (*)
(*)
(*****)
(*)      DEC. 1, 1982                        NPROC                      (*)
(*****)
(*)
(*) Description :
(*) This program formats the files needed to start up a CAT system. It
(*) initializes the files to a prescribed size. The files it will set up
(*) are those files needed for the subtest database, the examinee database,
(*) the system startup datafile, and the infotable datafiles. This program
(*) should be used with caution because initializing files means that ANY
(*) EXISTING FILES WHICH ARE REINITIALIZED WILL CAUSE EXISTING DATA TO BE LOST.
(*)
(*****)
```

# PROGRAM FORMATFILES;

```
CONST (* ascii values *)
BELL      = 7;
NIL       = -1;
MAXITEMBUF = 511;
MAXSUBTEST = 20;
```

```
TYPE (* different types of ways to answer a question *)
ITEMRESPONSES = (CHARVALUE, (* normal multiple choice *)
                 INTVALUE,   (* integer value as answer *)
                 SEVENCHR);  (* seven characters saved as answer *)
```

```
(* type of question response *)
SEVENTYPE = PACKED ARRAY[1..7] OF CHAR;
```

```
(* all characters *)
SETOFCHAR = SET OF CHAR;
```

```
VAR COMMAND,
    OUTPUT : char; (* dummy variable for page function *)
```

```
(* read an acceptable character from the keyboard *)
FUNCTION GETCHAR(OKSET : SETOFCHAR;
                 FLUSHQUEUE,ECHO,BEEP : BOOLEAN) : CHAR;
VAR MASK : PACKED ARRAY[0..0] OF CHAR;
BEGIN
    IF FLUSHQUEUE THEN UNITCLEAR(2); (* flush buffer *)
    REPEAT
        UNITREAD(2,MASK,1);
        IF BEEP AND NOT (MASK[0] IN OKSET) THEN WRITE(CHR(BELL));
    UNTIL MASK[0] IN OKSET;
    IF ECHO AND (MASK[0] IN [CHR(32)..CHR(126)]) THEN
        WRITE(MASK[0]);
    GETCHAR := MASK[0];
END; (* getchar *)
```

```
(* clear screen *)
PROCEDURE PAGE(DUMMY : CHAR);
BEGIN
    WRITE(CHR(28));
    GOTOXY(0,0);
END; (* page *)
```

```
(* initialize the test directory *)
```

PROCEDURE SUBTESTFORMAT;

CONST DATANAME = 'CATDATA:ITEMPOOL.DATA'; (\* question data \*)  
 TEXTNAME = 'QTEXT:ITEMTEXT.DATA'; (\* question text \*)  
 INDEXNAME = 'CATDATA:TESTINDEX.DATA'; (\* test directory \*)

(\* slots available in test directory, 0 - 20 \*)  
 MAXSUBTESTS = 20;

(\* maximum question pool per test, 0 - 300 \*)  
 MAXITEMPOOL = 300;

TYPE (\* test directory \*)

DIRDATA = PACKED RECORD

UNUSED : BOOLEAN;  
 TESTNAME : STRING;  
 ITEMCODE : PACKED ARRAY  
 (0..MAXITEMPOOL)  
 OF INTEGER; (\* question code # \*)

END;

(\* question ptrs/data , information for each question \*)

ITEMDATA = PACKED RECORD

GRAPHICS : BOOLEAN;  
 LOWANSWER,  
 HIGHANSWER : CHAR;  
 ITEMBLOCK,  
 ITEMPTR,  
 ANSWERCOUNT : INTEGER;  
 A,B,C,  
 PROPCORRECT,  
 POINTBISERIAL,  
 YOPT,  
 XOPT,  
 DUMMY1,  
 DUMMY2,  
 DUMMY3 : REAL;  
 CASE ATYPE : ITEMRESPONSES OF  
 CHARVALUE : (ANSWER : CHAR);  
 INTVALUE : (INTANSWER : INTEGER);  
 SEVENCHR : (CHRANSWER : SEVENTYPE);

END;

VAR I : INTEGER;

CURRBLOCK,  
 CURRFREEPTR,  
 CURRINDEXRECNUM : INTEGER;

(\* block of ascii, control codes \*)  
 ITEMBUF : PACKED ARRAY(0..MAXITEMBUF) OF 0..139;

(\* test directory \*)  
 DIRECTORY : DIRDATA;  
 FILEDIRECTORY : FILE OF DIRDATA;

(\* test question ptrs/data \*)  
 ITEMINFO : ITEMDATA;  
 FILEITEMINFO : FILE OF ITEMDATA;

(\* file of ascii codes, control #'s \*)  
 ITEMTEXT : FILE;

(\* with data for that question \*)  
 FUNCTION HASH(KEY : INTEGER) : INTEGER;  
 BEGIN  
 HASH :=  
 (CURRINDEXRECNUM \* MAXITEMPOOL)  
 + KEY + CURRINDEXRECNUM;

END; (\* hash \*)

(\* saves value of free space, block & byte ptr\*)  
 (\* in block 0, bytes 0..3 of text file \*)

PROCEDURE SAVEPTRS;

VAR TRIX : RECORD CASE INTEGER OF  
     1 : (TWOBYTES : PACKED ARRAY  
           (0..1) OF CHAR);  
     2 : (INTVALUE : INTEGER);  
 END;

(\* writes the item ascii buffer to diskfile \*)

PROCEDURE WRITEITEMBLOCK(WHICHBLOCK : INTEGER);

VAR BLOCKSTRANSFERRED,

    ERRNUM : INTEGER;

    BADIO : BOOLEAN;

BEGIN

    BADIO := FALSE;

    RESET(ITEMTEXT, TEXTNAME);

    BLOCKSTRANSFERRED :=

        BLOCKWRITE(ITEMTEXT, ITEMBUF, 1, WHICHBLOCK);

    BADIO := ((BLOCKSTRANSFERRED < 1) OR (IORESULT <> 0));

    ERRNUM := IORESULT;

    CLOSE(ITEMTEXT, LOCK);

    IF BADIO THEN

        BEGIN

            WRITELN; WRITELN;

            WRITE('Block write io error # ', ERRNUM);

            WRITELN;

            WRITELN('Possibly no room to expand ', TEXTNAME);

            WRITELN('Must have unused space at end of file');

            WRITELN('or put file at end of directory.');

            WRITELN;

            READLN;

            EXIT(PROGRAM);

        END;

END; (\* writeitemblock \*)

(\* reads a block from disk into the item ascii buffer \*)

PROCEDURE READITEMBLOCK(WHICHBLOCK : INTEGER);

VAR BLOCKSTRANSFERRED,

    ERRNUM : INTEGER;

    BADIO : BOOLEAN;

BEGIN

    BADIO := FALSE;

    RESET(ITEMTEXT, TEXTNAME);

    BLOCKSTRANSFERRED :=

        BLOCKREAD(ITEMTEXT, ITEMBUF, 1, WHICHBLOCK);

    BADIO := ((BLOCKSTRANSFERRED < 1) OR (IORESULT <> 0));

    ERRNUM := IORESULT;

    CLOSE(ITEMTEXT, LOCK);

    IF BADIO THEN

        BEGIN

            WRITELN; WRITELN;

            WRITE('Block read io error # ', ERRNUM);

            WRITELN;

            WRITELN('Cant read ', TEXTNAME);

            WRITELN;

            READLN;

            EXIT(PROGRAM);

        END;

END;

BEGIN (\* saveptrs \*)

    READITEMBLOCK(0);

    TRIX.INTVALUE := CURRBLOCK;

    MOVELEFT(TRIX, TWOBYTES(0), ITEMBUF(0), 2);

    TRIX.INTVALUE := CURRFREEPTR;

    MOVELEFT(TRIX, TWOBYTES(0), ITEMBUF(2), 2);

    WRITEITEMBLOCK(0);

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MICROCOMPUTER NETWORK FOR COMPUTERIZED ADAPTIVE TESTING 5/5

(CAT): PROGRAM LI. (U) NAVY PERSONNEL RESEARCH AND  
DEVELOPMENT CENTER SAN DIEGO CA B QUAN ET AL. MAR 84

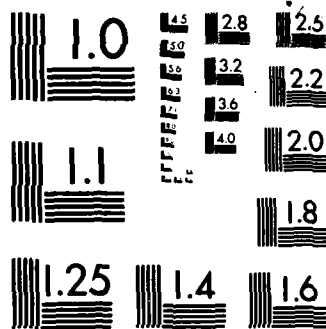
UNCLASSIFIED

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F/G 9/2

NL





MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS 1963-A

```

END; (* save ptrs *)

BEGIN (* stfileformat *)
PAGE(OUTPUT);
Writeln;
WRITE(' Are you sure you want');
WRITE(' to zero the directory ? Y/N ');
IF GETCHAR(['y','n','Y','N'],TRUE,FALSE,TRUE) IN ['Y','y'] THEN
BEGIN
Writeln;
Writeln;
WRITE(' Zeroing directory');
DIRECTORY.UNUSED := TRUE;
FOR I := 0 TO MAXITEMPOOL DO
    DIRECTORY.ITEMCODE(I) := NIL;
REWRITE(FILEDIRECTORY,INDEXNAME);
FOR I := 0 TO MAXSUBTESTS DO
BEGIN
WRITE('.');
SEEK(FILEDIRECTORY,I);
FILEDIRECTORY^ := DIRECTORY;
PUT(FILEDIRECTO
END;
CLOSE(FILEDIRECTORY,LOCK);
CURRINDEXRECNUM := MAXSUBTESTS - 1;
I := HASH(MAXITEMPOOL);
REWRITE(FILEITEMINFO,DATANAME);
SEEK(FILEITEMINFO,I);
CLOSE(FILEITEMINFO,LOCK);
REWRITE(ITEMTEXT,TEXTNAME);
I := BLOCKWRITE(ITEMTEXT,ITEMBUF,1,0);
CLOSE(ITEMTEXT,LOCK);
CURRBLOCK := 0;
CURRFREEPTR := 4;
SAVEPTRS;
END;
END; (* stzerodirectory *)

(*** initialize the examinee files ***)
PROCEDURE EFORMAT;

CONST EINDEX = 'CATDATA:EINDEX.DATA'; (* examinee directory *)
INFONAME = 'CATDATA:EINFO.DATA'; (* examinee data *)
RESULTS = 'CATDATA:ERESULTS.DATA'; (* examinee test scores *)
PINFONAME = 'CATDATA:EPDATA.DATA'; (* examinee personal data *)
DONEINDEX = 'CATDATA:DONE-DIR.DATA'; (* done examinee directory *)
DONEINFO = 'CATDATA:DONE-INFO.DATA'; (* done examinee test info *)
DONERESULTS = 'CATDATA:DONE-RSLTS.DATA'; (* done test results *)
DONEPINFONAME = 'CATDATA:DONE-EPD.DATA'; (* done personal data *)

(* slots available in examinee directory, 0 - 50 *)
MAXEXAMINEE = 50;

(* max # of questions you can give per test *)
QUESTIONS = 20;

TYPE (* social security number *)
IDTYPE = PACKED ARRAY[0..8] OF CHAR;

(* examinee directory *)
INDEX = PACKED ARRAY[0..MAXEXAMINEE] OF PACKED RECORD
    UNUSED : BOOLEAN;
    ID : IDTYPE;
END;

(* examinee testing data *)
EXAMINEINFO = PACKED RECORD
    ID : IDTYPE;

```

```

ORIENTATION_TIME,
PREV_TIME_LASTTEST,
NUMPROC,
TOTTIMECONSOLE,
NUMERRORS,
LASTTEST      : INTEGER;
DATE          : PACKED ARRAY(0..5) OF CHAR;
TIME          : PACKED ARRAY(0..3) OF CHAR;
TESTORDER,
STRATEGY,
TESTLENGTH    : PACKED ARRAY(1..GMAXSUBTEST)
                OF 0..128;
CKERROR       : ARRAY(1..GMAXSUBTEST) OF REAL;
SUBSTOP       : PACKED ARRAY(1..GMAXSUBTEST) OF BOOLEAN;
END;

```

(\* question scores , data on examinee with respect to question \*)

```

ITEM = PACKED RECORD
  ACCORRECT : PACKED ARRAY(0..6) OF BOOLEAN;
  ACOUNT,
  ITEMNUM   : INTEGER;
  CORRECT   : BOOLEAN;
  THETA,
  ERROR,
  LATENCY   : REAL;
  CASE RTYPE : ITEMRESPONSES OF
    CHARVALUE : (RESPONSE : CHAR);
    INTVALUE  : (INTRESPONSE : INTEGER);
    SEVENCHR   : (CHRRESPONSE : SEVENTYPE);
END;

```

(\* test scores of examinee results \*)

```

SUBTEST = PACKED RECORD
  STTIME,
  STINSTRTIME,
  STPROCTCALLS,
  STERRKEY      : INTEGER;
  NUMITEMS,
  NUMCORR : 0..128;
  ESTABILITY,
  VARIANCE   : REAL;
  ITEMINFO   : PACKED ARRAY(0..QUESTIONS) OF ITEM;
END;

```

(\* examinee personal data \*)

```

PINFOREC = RECORD
  LASTNAME : PACKED ARRAY(0..14) OF CHAR;
  FIRSTNAME : PACKED ARRAY(0..11) OF CHAR;
  MINIMAL : CHAR;
  CURRADRESS,
  HOMEFOREC : PACKED ARRAY(0..1) OF CHAR;
  CITIZENSHIP : PACKED ARRAY(0..3) OF CHAR;
  SEX : CHAR;
  POPGROUP : PACKED ARRAY(0..4) OF CHAR;
  ETHNIC : PACKED ARRAY(0..1) OF CHAR;
  MARITAL : CHAR;
  DEPENDANTS : PACKED ARRAY(0..1) OF CHAR;
  BIRTHDATE : PACKED ARRAY(0..7) OF CHAR;
  EDUCATION : PACKED ARRAY(0..2) OF CHAR;
  TESTID : PACKED ARRAY(0..2) OF CHAR;
  AFOT : PACKED ARRAY(0..1) OF CHAR;
  ASVAB : PACKED ARRAY(0..43) OF CHAR;
  ENLISTDATE,
  ACTSERDATE : PACKED ARRAY(0..7) OF CHAR;
  ENL : PACKED ARRAY(0..4) OF CHAR;
  AFES : PACKED ARRAY(0..1) OF CHAR;
  SOMETHING : PACKED ARRAY(0..3) OF CHAR;
END;

```

```

VAR MAXRECORDS,
    I : INTEGER;

(* examinee test taking data *)
EXAMINEE : EXAMINFO;
FILEEXAMINEE : FILE OF EXAMINFO;

(* examinee directory *)
DIR : INDEX;
EDIR : FILE OF INDEX;

(* examinee test results *)
TESTS : SUBTEST;
FILETESTS : FILE OF SUBTEST;

(* examinee personal data *)
PINFO : PINFOREC;
PINFOFILE : FILE OF PINFOREC;

(* format the examinee directory for the session examinees and *)
(* the done examinee files. *)
PROCEDURE MAKEDIRECTORY;
BEGIN
    FOR I := 0 TO MAXEXAMINEE DO
        DIR[I].UNUSED := TRUE;

    REWRITE(EDIR,EINDEX);
    SEEK(EDIR,0);
    EDIR^ := DIR;
    PUT(EDIR);
    CLOSE(EDIR,LOCK);

    REWRITE(EDIR,DONEINDEX);
    SEEK(EDIR,0);
    EDIR^ := DIR;
    PUT(EDIR);
    CLOSE(EDIR,LOCK);
END; (* make directory *)

(* format the files containing the test taking information *)
PROCEDURE MAKETINFO;
BEGIN
    WITH EXAMINEE DO
        BEGIN
            ID := ' ';
            LASTTEST := 10; (* mark no tests taken yet *)
            NUMPROC := 0;
            TOTTIMECONSOLE := 0;
            NUMERRORS := 0;
            PREVTIMELASTTEST := 0;
            ORIENTATIONTIME := 0;
        END;

    REWRITE(FILEEXAMINEE,INFONAME);
    SEEK(FILEEXAMINEE,0);
    FOR I := 0 TO MAXEXAMINEE DO
        BEGIN
            FILEEXAMINEE^ := EXAMINEE;
            PUT(FILEEXAMINEE);
        END;
    CLOSE(FILEEXAMINEE,LOCK);

    REWRITE(FILEEXAMINEE,DONEINFO);
    SEEK(FILEEXAMINEE,0);
    FOR I := 0 TO MAXEXAMINEE DO
        BEGIN
            FILEEXAMINEE^ := EXAMINEE;
            PUT(FILEEXAMINEE);
        END;
    CLOSE(FILEEXAMINEE,LOCK);

```

END; (\* maketinfo \*)

(\* format the files containg testing results information \*)

PROCEDURE FORMATRESULTSFILE;

BEGIN

MAXRECORDS := (MAXEXAMINEES \* GMAXSUBTEST) + GMAXSUBTEST;

WITH TESTS DO

BEGIN

STTIME := 0;

STINSTRTIME := 0;

STPROCTCALLS := 0;

STERRKEY := 0;

NUMITEMS := 0;

NUMCORR := 0;

ESTABILITY := 0;

END;

REWRITE(FILETESTS, RESULTS);

SEEK(FILETESTS, 0);

WRITELN;

FOR I := 0 TO MAXRECORDS DO

BEGIN

IF (I MOD 10) = 0 THEN

WRITE('.');

FILETESTS^ := TESTS;

PUT(FILETESTS);

END;

CLOSE(FILETESTS, LOCK);

REWRITE(FILETESTS, DONERESULTS);

SEEK(FILETESTS, 0);

WRITELN;

FOR I := 0 TO MAXRECORDS DO

BEGIN

IF (I MOD 10) = 0 THEN

WRITE('.');

FILETESTS^ := TESTS;

PUT(FILETESTS);

END;

CLOSE(FILETESTS, LOCK);

END; (\* formatresultsfile \*)

(\* format the personal data file \*)

PROCEDURE MAKEPERSONALINFO;

BEGIN

WITH PINFO DO

BEGIN

LASTNAME := ';

FIRSTNAME := ';

INITIAL := ';

CURRADDRESS := ';

HOMEOFREC := ';

CITIZENSHIP := ';

SEX := ';

POPGROUP := ';

ETHNIC := ';

MARITAL := ';

DEPENDANTS := ';

BIRTHDATE := ';

EDUCATION := ';

TESTID := ';

AFQT := ';

ASVAB := ';

ENLISTDATE := ';

ACTSERDATE := ';

ENL := ';

AFES := ';

SOMETHING := ';

END;

REWRITE(PINFOFILE, PINFONAME);

```

        SEEK(PINFOFILE,0);
        FOR I := 0 TO 50 DO
        BEGIN
            PINFOFILE^ := PINFO;
            PUT(PINFOFILE);
        END;
        CLOSE(PINFOFILE,LOCK);

        REWRITE(PINFOFILE,DONEPINFO);
        SEEK(PINFOFILE,0);

        FOR I := 0 TO 50 DO
        BEGIN
            PINFOFILE^ := PINFO;
            PUT(PINFOFILE);
        END;
        CLOSE(PINFOFILE,LOCK);
    END; (* makepersonalinfo *)

BEGIN (* eformat *)
    PAGE(OUTPUT);
    WRITELN;
    WRITELN(' Are you sure you want');
    WRITE(' to zero the directory? Y/N : ');
    IF GETCHAR(['Y','N'],TRUE,TRUE,TRUE) = 'Y' THEN
    BEGIN
        (* MAKEDIRECTORY; *)

        MAKETINFO;
        FORMATRESULTSFILE;
        (* MAKEPERSONALINFO; *)

    END;
END; (* eformat *)

(* Initialize the startup format *)
PROCEDURE STARTUPFORMAT;

CONST SETUPDATA = 'CATDATA:PARAMETERS.DATA'; (* test default parameters *)

TYPE (* set-up parameters *)
    SETUPINFO = PACKED RECORD
        SUBORDER,
        SUBSTRAT          : PACKED ARRAY[1..GMAXSUBTEST]
                           OF 0..128;
        ITEMFB,
        ITEMOUTPUT,
        SUBTESTFB,
        SUBTESTOUTPUT,
        SESSIONFB,
        SESSIONOUTPUT     : 0..128;
        SUBSTOP            : PACKED ARRAY[1..GMAXSUBTEST] OF BOOLEAN;
        SUBLLENGTH        : PACKED ARRAY[1..GMAXSUBTEST]
                           OF 0..128;
        CKERROR           : ARRAY[1..GMAXSUBTEST] OF REAL;
    END;

VAR I : INTEGER;

    (*** set-up variables ***)
    SPARAMS : SETUPINFO;
    FILESPARAMS : FILE OF SETUPINFO;

BEGIN
    PAGE(OUTPUT);
    WRITELN;
    WRITELN(' Are you sure you want');
    WRITE(' to zero the parameter file. Y/N : ');
    IF GETCHAR(['Y','Y','N','n'],TRUE,TRUE,TRUE) IN ['Y','Y'] THEN

```

```

BEGIN
  WITH SPARAMS DO
  BEGIN
    FOR I := 1 TO GMAXSUBTEST DO
    BEGIN
      SUBORDER[I] := 128;
      SUBSTRAT[I] := 0;
      SUBSTOP[I] := FALSE;
      SUBLLENGTH[I] := 0;
      CKERROR[I] := 1.0;
    END;
    ITEMFB := 0;
    ITEMOUTPUT := 0;
    SUBTESTFB := 0;
    SUBTESTOUTPUT := 0;
    SESSIONFB := 0;
    SESSIONOUTPUT := 0;
  END;
  REWRITE(FILESPARAMS,SETUPDATA);
  SEEK(FILESPARAMS,0);
  FILESPARAMS^ := SPARAMS;
  PUT(FILESPARAMS);
  CLOSE(FILESPARAMS,LOCK);
END;      (* startupformat *)

(* infotable files initialization *)
PROCEDURE INFOSETUP;

CONST(* information tables *)
  TABNAME = 'CATDATA;TABINFO.DATA';

  (* information table dimensions *)
  INFOROW = 36;
  INFOCOLUMN = 20;

  MAXSUBTESTS = 20;

TYPE TABLE = ARRAY[1..INFOCOLUMN,1..INFOROW] OF INTEGER;

VAR COMMAND : CHAR;
    I,J : INTEGER;
    INFOTABLE : TABLE;
    INFOFILE : FILE OF TABLE;

BEGIN  (* infosetup *)
  PAGE(OUTPUT);
  WRITELN('Are you sure you wish to initialize?');
  WRITELN('This will destroy all existing info-');
  WRITELN('tables. ');
  IF GETCHAR(['Y','N','n','y'],TRUE,FALSE,TRUE) IN ['Y','y'] THEN
  BEGIN
    WRITELN;
    WRITE('Last chance! Do you wish to initialize?');
    IF GETCHAR(['Y','N','n','y'],TRUE,FALSE,TRUE) IN ['Y','y'] THEN
    BEGIN
      FOR J := 1 TO INFOROW DO
        FOR I := 1 TO INFOCOLUMN DO
          INFOTABLE[I,J] := NIL;
      REWRITE(INFOFILE,TABNAME);
      PAGE(OUTPUT);
      WRITE('initializing');
      FOR I := 0 TO ((MAXSUBTESTS * 2) + 1) DO
      BEGIN
        WRITE('. ');

```

```

        SEEK(INFOFILE,1);
        INFOFILE^:= INFOTABLE;
        PUT(INFOFILE);
    END;
    CLOSE(INFOFILE,LOCK);
END;
END; (* initfile *)

(* give warning message *)
PROCEDURE WARNING;
var chr : char;
BEGIN
    PAGE(OUTPUT);
    WRITELN('***** WARNING *****');
    writeln('          This is a very dangerous program so');
    writeln('          if you dont know what you are doing, get');
    writeln('          out now while you still can with your');
    writeln('          life.  If you execute any of the options');
    writeln('          in this program, you will annihilate all');
    writeln('          data in certain files and cause hours of');
    writeln('          hard work to be lost. ');
    WRITELN;
    WRITELN;
    write(' DO YOU WISH TO CONTINUE ?   : ');
    readln(chr);
    if not (chr in ['y','Y']) then
        exit(program);
    writeln;
    write(' ARE YOU SURE YOU WANT TO CONTINUE ?   : ');
    readln(chr);
    if not (chr in ['y','Y']) then
        exit(program);
    writeln;
    write(' LAST CHANCE !!!!!   CONTINUE ?   : ');
    readln(chr);
    if not (chr in ['y','Y']) then
        exit(program);
END; (* warning *)

(* main program *)
BEGIN
    WARNING;
    REPEAT
        PAGE(OUTPUT);
        GOTOXY(5,5);
        WRITE('1) Format Subtest Database Files');
        GOTOXY(5,7);
        WRITE('2) Format Examinee Database Files');
        GOTOXY(5,9);
        WRITE('3) Format System Parameter Files');
        GOTOXY(5,11);
        WRITE('4) Format Infotables');
        GOTOXY(5,13);
        WRITE('5) Quit');
        GOTOXY(1,1);
        WRITE('Command : ');
        COMMAND := GETCHAR(['1'..'4'],TRUE,TRUE,TRUE);
        CASE COMMAND OF
            '1' : (* SUBTESTFORMAT *);
            '2' : EFORMAT;
            '3' : STARTUPFORMAT;
            '4' : INFOSETUP;
            '5' : ;
        END;
    UNTIL COMMAND = '5';
END. (* format files *)

```

```
(*S+*)
(*-----*)
(*      Textfile : MISC/CATKRUNCH.TEXT      Volume : TFILES      *)
(*      Codefile :                          Volume :              *)
(*-----*)
(*      DEC. 1, 1982                        NPROC                  *)
(*-----*)
(* This program goes through all the subtests and crunches the unused space *)
(* between text in the ascii file and resets the block and byte pointers for *)
(* each question.                                                            *)
(*-----*)
(* The old files, directory.data, and text are not changed, in case of *)
(* program crash during crunch. Instead, 3 new files are created. They are: *)
(*      1. Newdir.data *)
(*      2. Newdata.data *)
(*      3. Newtext.data *)
(* These are respectively, the directory, data and textfiles. They are *)
(* written to the same volumes the old files reside on. To use the new *)
(* files, change the filenames declared in each program, test to see if *)
(* any data errors occurred in transfer, then change the new file names to *)
(* the old file names on the volumes and in the programs, so the next future *)
(* crunch will see the new files as the old files. *)
(*-----*)
```

PROGRAM TEXTTRANSFER;

```
CONST (* block sized buffer for ascii *)
      MAXITEMBUF = 511;
      NIL = -1;
```

```
(* question textfile control codes *)
GOTOFLAG = 128; (* flags a gotoxy *)
PAGEFLAG = 129; (* flags text continues on another page *)
UNUSEDFLAG = 130; (* flags unused byte *)
ENDITEM = 131; (* flags end of text for a question *)
```

```
(* these files must reside on disk ! *)
DATANAME = 'CATDATA:ITEMPOOL.DATA'; (* question data *)
TEXTNAME = 'QTEXT:ITEMTEXT.DATA'; (* question text *)
INDEXNAME = 'CATDATA:TESTINDEX.DATA'; (* test directory *)
```

```
(* slots available in directory *)
MAXSUBTESTS = 20;
(* maximum question pool per test *)
MAXITEMPOOL = 300;
```

```
(* maximum # of sample questions allowed *)
MAXSAMPLES = 5;
```

```
TYPE DIRDATA = PACKED RECORD (* directory for tests *)
      UNUSED : BOOLEAN; (* tells if record occupied *)
      TESTNAME : STRING; (* name of subtest *)
      (* subtest directory of question id codes *)
      ITEMCODE : PACKED ARRAY
        (0..MAXITEMPOOL)
        OF INTEGER;
END;
```

```
(* types of answers to questions *)
ITEMRESPONSES = (CHARVALUE, INTVALUE, SEVENCHR);
```

ITEMDATA = PACKED RECORD (\* question ptrs/data \*)

```

(* flag this as graphics item *)
GRAPHICS : BOOLEAN;
(* bounds for response range *)
LOWANSWER,
HIGHANSWER : CHAR;
(* block # where question text starts *)
ITEMBLOCK,
(* byte ptr where question text starts *)
ITEMPTR,
(* # of answers for multiple question screens *)
ANSWERCOUNT : INTEGER;
(* information parameters *)
A,B,C,
PROPCORRECT,
POINTBISERIAL,
YOPT,
XOPT,
DUMMY1,
DUMMY2,
DUMMY3 : REAL;

(* answer to question *)
CASE ATYPE : ITEMRESPONSES OF
  CHARVALUE : (ANSWER : CHAR);
  INTVALUE : (INTANSWER : INTEGER);
  SEVENCHR : (CHRANSWER : PACKED ARRAY[1..7] OF
    CHAR);

```

END;

VAR ITEMBUF : PACKED ARRAY[0..511] OF 0..139;

```

CURRINDEXRECNUM, (* record # of file directory *)
CURRBLOCK, (* block # of start of item text *)
CURRFREEPTR : INTEGER; (* ptr to free loc in block *)

```

```

DIRECTORY : DIRDATA;
FILEDIRECTORY : FILE OF DIRDATA;

```

```

ITEMINFO : ITEMDATA;
FILEITEMINFO : FILE OF ITEMDATA;

```

```

(* file of ascii codes, control #'s *)
ITEMTEXT : FILE;

```

```

PROCEDURE STALL;
BEGIN
  WRITE('Type return');
  readln;
end;

```

```

(* returns the slot # in subtest directory where question is, *)
(* nil if the question code is not in the directory *)
FUNCTION SLOTSEARCH(CODE : INTEGER) : INTEGER;
VAR SLOT : INTEGER;
    FOUND : BOOLEAN;
BEGIN
  SLOT := MAXSAMPLES + 1;
  FOUND := FALSE;
  REPEAT
    IF DIRECTORY.ITEMCODE(SLOT) = CODE THEN
      FOUND := TRUE
    ELSE
      SLOT := SLOT + 1;
  UNTIL (SLOT > MAXITEMPOOL) OR (FOUND);
  IF FOUND THEN
    SLOTSEARCH := SLOT
  
```

```
ELSE
  SLOTSEARCH := NIL;
END; (* slot search *)
```

```
(* returns record # of question data file *)
(* no collisions. This is a mapping *)
(* function which takes the location a *)
(* question code exists in a subtest *)
(* directory, the maximum questions per *)
(* subtest and the subtest record number *)
(* and maps it to a location in a file *)
(* with data for that question *)
FUNCTION HASH(KEY : INTEGER) : INTEGER;
```

```
BEGIN
  HASH :=
    (CURRINDEXRECNUM * MAXITEMPOOL)
    + KEY + CURRINDEXRECNUM;
END; (* hash *)
```

```
(* reads a block from disk into the item ascii buffer *)
PROCEDURE READITEMBLOCK(WHICHBLOCK : INTEGER);
VAR BLOCKSTRANSFERRED,
    ERRNUM : INTEGER;
```

```
BADIO : BOOLEAN;
BEGIN
  BADIO := FALSE;
  RESET(ITEMTEXT, TEXTNAME); (* question text *)
  BLOCKSTRANSFERRED :=
    BLOCKREAD(ITEMTEXT, ITEMBUF, 1, WHICHBLOCK);
  BADIO := ((BLOCKSTRANSFERRED < 1) OR (IORESULT <> 0));
  ERRNUM := IORESULT;
  CLOSE(ITEMTEXT, LOCK);
  IF BADIO THEN
    BEGIN
      WRITELN; WRITELN;
      WRITE('Block read io error # ', ERRNUM);
      STALL;
      EXIT(PROGRAM);
    END;
  END;
END;
```

```
PROCEDURE TRANSFER;
CONST FDIRNAME = 'CATDATA:NEWDIR.DATA';
      FDATAName = 'CATDATA:NEWDATA.DATA';
      FTEXTNAME = 'QTEXT:NEWTEXT.DATA';
```

```
VAR I,
    J,
    K,
    DATARECNUM,
    FCURRBLOCK, (* current free block *)
    FCURRFREEPTR,
    ERRNUM : INTEGER; (* current free byte in free block *)
```

```
(* directory *)
FDIR : DIRDATA;
FDIRFILE : FILE OF DIRDATA;
```

```
(* question data *)
FOATA : ITEMDATA;
FOATAFILE : FILE OF ITEMDATA;
```

```
(* question text *)
FTEXT : FILE;
```

```
(* block sized buffer for ascii & control codes *)
FITEMBUF      : PACKED ARRAY[0..511] OF 0..139;
```

```
(* This procedure writes a block of question ascii from the block *)
(* sized buffer to the disk in the ascii file. *)
```

```
PROCEDURE FWRITEITEMBLOCK(WHICHBLOCK : INTEGER);
VAR BLOCKSTRANSFERRED,
    ERRNUM : INTEGER;
    BADIO : BOOLEAN;
BEGIN
    BADIO := FALSE;
    RESET(FTEXT,FTEXTNAME);
    BLOCKSTRANSFERRED :=
        BLOCKWRITE(FTEXT,FITEMBUF,1,WHICHBLOCK);
    BADIO := ((BLOCKSTRANSFERRED < 1) OR (IORESULT <> 0));
    ERRNUM := IORESULT;
    CLOSE(FTEXT,LOCK);
    IF BADIO THEN
        BEGIN
            WRITELN;WRITELN;
            WRITE('Block write io error # ',ERRNUM);
            WRITELN;
            STALL;
            EXIT(PROGRAM);
        END;
    END; (* fwriteitemblock *)
```

```
(* reads a block from disk into the item ascii buffer *)
```

```
PROCEDURE FREADITEMBLOCK(WHICHBLOCK : INTEGER);
VAR BLOCKSTRANSFERRED,
    ERRNUM : INTEGER;
    BADIO : BOOLEAN;
BEGIN
    BADIO := FALSE;
    RESET(FTEXT,FTEXTNAME);
    BLOCKSTRANSFERRED :=
        BLOCKREAD(FTEXT,FITEMBUF,1,WHICHBLOCK);
    BADIO := ((BLOCKSTRANSFERRED < 1) OR (IORESULT <> 0));
    ERRNUM := IORESULT;
    CLOSE(FTEXT,LOCK);
    IF BADIO THEN
        BEGIN
            WRITELN;WRITELN;
            WRITE('Block read io error # ',ERRNUM);
            WRITELN;
            STALL;
            EXIT(PROGRAM);
        END;
    END;
END;
```

```
(* saves value of free space, block & byte ptrs)
(* in block 0, bytes 0..3 of text file *)
```

```
PROCEDURE FSAVEPTRS;
VAR TRIX : RECORD CASE INTEGER OF
    1 : (TWOBYTES : PACKED ARRAY
        [0..1] OF CHAR);
    2 : (INTVALUE : INTEGER);
END;
BEGIN
    FREADITEMBLOCK(0);
    TRIX.INTVALUE := FCURRBLOCK;
    MOVELEFT(TRIX.TWOBYTES[0],FITEMBUF[0],2);
    TRIX.INTVALUE := FCURRFREEPTR;
    MOVELEFT(TRIX.TWOBYTES[0],FITEMBUF[2],2);
    FWRITEITEMBLOCK(0);
END; (* fsave ptrs *)
```

```

(* This procedure reads in the question text from the ascii file *)
(* of the corvus and block reads it onto the floppy. *)
PROCEDURE ASCII2DISK(CBLOCK,CPTR : INTEGER);
VAR CORVUSBLOCK,
    CORVUSPTR,
    CHARCOUNT : INTEGER;
BEGIN
    CORVUSBLOCK := CBLOCK;
    CORVUSPTR := CPTR;
    READITEMBLOCK(CORVUSBLOCK);      (* get block where text starts *)
    FREADITEMBLOCK(FCURRBLOCK);      (* set buffer to fill *)

    (* read from corvus buffer into floppy buffer, if ptrs reach end *)
    (* of buffer, read in new block/write out full buffer *)
    WHILE ITEMBUF(CORVUSPTR) <> ENDITEM DO
    BEGIN
        FITEMBUF(FCURRFREEPTR) := ITEMBUF(CORVUSPTR);
        FCURRFREEPTR := FCURRFREEPTR + 1;
        CORVUSPTR := CORVUSPTR + 1;
        IF CORVUSPTR > 511 THEN
        BEGIN
            CORVUSBLOCK := CORVUSBLOCK + 1;
            CORVUSPTR := 0;
            READITEMBLOCK(CORVUSBLOCK);
        END;
        IF FCURRFREEPTR > 511 THEN
        BEGIN
            FWRITEITEMBLOCK(FCURRBLOCK);
            FCURRBLOCK := FCURRBLOCK + 1;
            FCURRFREEPTR := 0;
        END;
        FITEMBUF(FCURRFREEPTR) := ENDITEM;      (* mark end of text *)
        FCURRFREEPTR := FCURRFREEPTR + 1;
        FWRITEITEMBLOCK(FCURRBLOCK);
        IF FCURRFREEPTR > 511 THEN
        BEGIN
            FCURRBLOCK := FCURRBLOCK + 1;
            FCURRFREEPTR := 0;
            FWRITEITEMBLOCK(FCURRBLOCK);
        END;
    END;
    END;      (* ascii to floppy *)

BEGIN      (* transfer to 5 inch *)
    FCURRBLOCK := 0;
    FCURRFREEPTR := 4;      (* first four bytes reserved 0 - 3 *)

    REWRITE(FTEXT,FTEXTNAME);
    ERRNUM := BLOCKWRITE(FTEXT,FITEMBUF,1,0);
    CLOSE(FTEXT,LOCK);

    FOR K := 0 TO MAXSUBTESTS DO
    BEGIN

        (* get the subtest directory *)
        RESET(FILEIDIRECTORY,INDEXNAME);
        SEEK(FILEIDIRECTORY,K);
        GET(FILEIDIRECTORY);
        DIRECTORY := FILEIDIRECTORY^;
        CLOSE(FILEIDIRECTORY,NORMAL);
        FDIR := DIRECTORY;

        CURRINDEXRECNUM := K;

        IF NOT (DIRECTORY.UNUSED) THEN
        BEGIN
            RESET(FILEITEMINFO,DATANAME);
            RESET(FDATAFILE,FDATANAME);

```

```

(* transfer data, text and update text pointers *)
WRITELN;
WRITE('Transferring ', DIRECTORY.TESTNAME);
FOR I := 0 TO MAXITEMPOOL DO
BEGIN
  IF DIRECTORY.ITEMCODE(I) >= 0 THEN (* question exists *)
  BEGIN
    WRITE('.');
    DATAECNUM := HASH(I);
    SEEK (FILEITEMINFO, DATAECNUM);
    GET (FILEITEMINFO);
    ITEMINFO := FILEITEMINFO^;
    FDATA := ITEMINFO; (* transfer the data *)
    FDATA.ITEMBLOCK := FCURRBLOCK; (* set new text ptrs *)
    FDATA.ITEPTR := FCURRFREEPTR;
    SEEK (FDATAFILE, DATAECNUM);
    FDATAFILE^ := FDATA;
    PUT (FDATAFILE); (* write data to floppy *)

    (* transfer the text *)
    ASCIIITODISK (ITEMINFO.ITEMBLOCK, ITEMINFO.ITEPTR);
  END;
END;
FSAVEPTRS; (* save end of file marker *)
CLOSE (FILEITEMINFO, LOCK);
CLOSE (FDATAFILE, LOCK);
END;
END; (* transferto5inch *)

```

(\* main program \*)

```

BEGIN
  TRANSFER;
END.

```

END

FILMED

11/11/44

ADAMIC